

Workshop Manual

Audi A6 2011 ➤

Audi A6 China 2012 ➤

Audi A7 Sportback 2011 ➤

**Simos direct petrol injection and ignition system (6-cyl.
3.0 ltr. TFSI 4-valve)**

Engine ID	CGW B	CGX B	CHM A	CTTA	CGW D	CTU A			
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Edition 01.2012



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List of Workshop Manual Repair Groups

Repair Group

24 - Mixture preparation - injection

28 - Ignition system



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Technical information should always be available to the foremen and mechanics, because their careful and constant adherence to the instructions is essential to ensure vehicle road-worthiness and safety. In addition, the normal basic safety precautions for working on motor vehicles must, as a matter of course, be observed.

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24 – Mixture preparation - injection

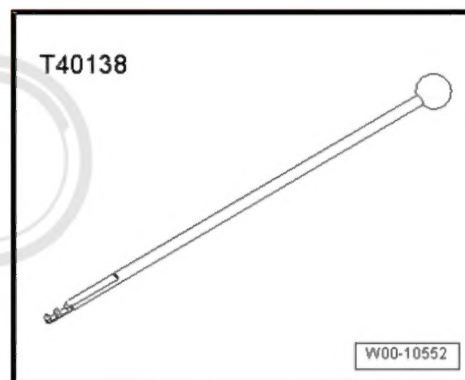
1 Safety precautions and rules for cleanliness

Overview

- ◆ ⇒ „1.1 General notes on self-diagnosis“, page 1
- ◆ ⇒ „1.2 Safety precautions when working on the fuel system“, page 2
- ◆ ⇒ „1.3 Safety precautions when working on the injection and ignition system“, page 2
- ◆ ⇒ „1.4 Safety precautions when working on vehicles with start/stop system“, page 3
- ◆ ⇒ „1.5 Safety precautions when using testers and measuring instruments during a road test“, page 3
- ◆ ⇒ „1.6 Rules for cleanliness and instructions for working on fuel system“, page 3
- ◆ ⇒ „1.7 Reducing pressure in high-pressure section of injection system“, page 4
- ◆ ⇒ „1.8 Checking for leaks in the fuel system“, page 5
- ◆ ⇒ „1.9 Checking vacuum system“, page 5

1.1 General notes on self-diagnosis

- ◆ The engine control unit has a self-diagnosis capability. Before carrying out repairs and fault finding, the event memory must be interrogated. The vacuum hoses and connections must also be checked (unmetered air).
- ◆ Fuel hoses in engine compartment must only be secured with spring-type clips. O-type clips or screw-type clips must not be used.
- ◆ A voltage of at least 11.5 V is required for proper operation of the electrical components.
- ◆ Do not use sealants containing silicone. Particles of silicone drawn into the engine will not be burnt in the engine and will damage the Lambda probe.
- ◆ The vehicles are fitted with a crash/fuel shut-off system. This system is designed to reduce the risk of a vehicle fire after a crash by deactivating the fuel pump via the fuel pump control unit.
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- ◆ At the same time, this system also improves the engine's starting performance. When the driver's door is opened, the fuel pump is activated for 2 seconds in order to build up pressure in the fuel system ⇒ page 2 .
- ◆ Use release tool -T40138- to unplug connectors that cannot be accessed easily.



1.2 Safety precautions when working on the fuel system

When working on the fuel system note the following warnings:



WARNING

- ◆ *If the battery is not disconnected, the fuse for the fuel pump control unit -J538- must be removed as a precautionary measure before opening the fuel system because the fuel pump will otherwise be activated by the contact switch on the driver's door.*
- ◆ *The fuel system is pressurised. The fuel pressure in the high-pressure section of the injection system must be reduced to a residual pressure prior to opening; for procedure see ➔ [page 4](#) .*
- ◆ *The connection must be opened immediately after reducing the pressure; wrap a cloth around the connection and allow the residual pressure (approx. 7 bar) to dissipate.*

1.3 Safety precautions when working on the injection and ignition system

To prevent injuries to persons and/or damage to the fuel injection and ignition system, note the following:

- ◆ Persons wearing a cardiac pacemaker must at all times maintain a safe distance from high-voltage components such as the ignition system and xenon headlights.
- ◆ Always switch off the ignition before connecting or disconnecting electrical wiring for the injection or ignition system or tester cables.
- ◆ For safety reasons, the battery must be disconnected before opening the fuel system to prevent the fuel pump from being activated by the contact switch on the driver's door.
- ◆ Do not open any fuel line connections while the engine is running.
- ◆ Always switch off ignition before washing engine.
- ◆ If you want to crank the engine at starting speed without actually starting the engine (e.g. compression test), first unplug the electrical connectors from the ignition coils ➔ [page 55](#) .
- ◆ Also remove fuse for fuel pump control unit -J538- ➔ Current flow diagrams, Electrical fault finding and Fitting locations.
- ◆ Entries will be stored in the event memory of the engine control unit if electrical connectors have been unplugged and the engine started.



Caution

To prevent irreparable damage to the electronic components when disconnecting the battery:

- ◆ *Observe notes on procedure for disconnecting the battery.*
- ◆ *Always switch off the ignition before disconnecting the battery.*

– Disconnect battery ➔ Electrical system; Rep. gr. 27 .

1.4 Safety precautions when working on vehicles with start/stop system



WARNING

Risk of injury due to automatic engine start on vehicles with start/stop system.

- ◆ *On vehicles with activated start/stop system (this is indicated by a message in the instrument cluster display), the engine may start automatically on demand.*
- ◆ *Therefore it is important to ensure that the start/stop system is deactivated when performing repairs (switch off ignition, if required switch on ignition again).*

1.5 Safety precautions when using testers and measuring instruments during a road test

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Note the following if testers and measuring instruments have to be used during a road test:



WARNING

Accidents can be caused if the driver is distracted by test equipment while road-testing, or if test equipment is not properly secured.

Persons sitting in the front passenger's seat could be injured if the airbag is triggered in an accident.

- *The use of test equipment while driving causes distraction.*
- *There is an increased risk of injury if test equipment is not secured.*
- ◆ *Test equipment must always be secured on the rear seat with a strap and operated from the rear seat by a second person.*

1.6 Rules for cleanliness and instructions for working on fuel system

Even small amounts of dirt can cause malfunctions. When working on the fuel supply system and injection system, pay careful attention to the following basic rules:

- ◆ Carefully clean connection points and the surrounding area with engine cleaner or brake cleaner and dry thoroughly before opening.
- ◆ Immediately seal off open lines and connections with clean plugs.
- ◆ Place parts that have been removed on a clean surface and cover them over. Do not use fluffy cloths.
- ◆ Carefully cover or seal open components if repairs cannot be carried out immediately.
- ◆ Only install clean components; replacement parts should only be unpacked immediately prior to installation. Do not use parts that have been previously unpacked and stored away loose (e.g. in toolboxes, etc.).

- ◆ When the system is open: Do not work with compressed air.
Do not move the vehicle unless absolutely necessary.
- ◆ Protect unplugged electrical connectors against dirt and moisture and make sure connections are dry when attaching.

1.7 Reducing pressure in high-pressure section of injection system



WARNING

The fuel system operates at extremely high pressure. This can cause injury.

- ◆ *The injection system consists of a high-pressure section (maximum approx. 120 bar) and a low-pressure section (approx. 7 bar).*
- ◆ *The fuel pressure in the high-pressure section must be reduced to a residual pressure of approx. 7 bar prior to opening the system. The procedure is described below.*

Special tools and workshop equipment required

- ◆ ⇒ Vehicle diagnostic tester

Reducing fuel pressure in high-pressure section:

- Connect a ⇒ Vehicle diagnostic tester.
- Start engine and run at idling speed.
- Select „Engine electronics“ in vehicle self-diagnosis.
- Then select „Basic setting“.
- Select „Reducing fuel pressure in fuel rail“ from the list.
- Then select „Measured values“.
- Select „Operating instructions“ and „Fuel pressure“ from the list.
- To activate basic setting, perform „Operating instructions“ function.
- Observe fuel pressure displayed on ⇒ Vehicle diagnostic tester.
- Fuel pressure will drop to a specified value.
- Switch off engine with pedals depressed.

The fuel rail is still filled with fuel, however it is no longer under high pressure.



WARNING

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There is a risk of injury: avoid skin contact with fuel.

- ◆ *Wear safety goggles and protective clothing when opening the fuel system.*
- ◆ *Before opening the high-pressure section of the fuel system, place a clean cloth around the connection to catch escaping fuel.*

- The high-pressure system must be opened »immediately« after reducing the fuel pressure; wrap a clean cloth around the connection. Catch the escaping fuel.



Note

The pressure will increase again due to the effect of residual heat if the high-pressure system is not opened immediately.

Additional steps required

- Erase event memory and generate readiness code in engine control unit in „Guided Functions“ mode.

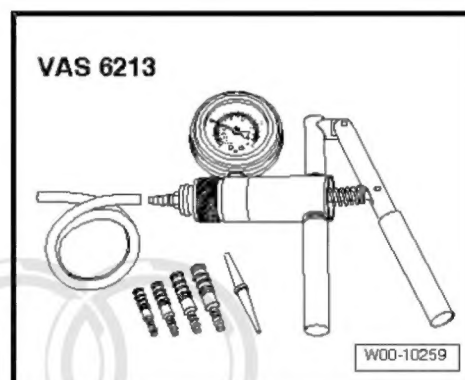
1.8 Checking for leaks in the fuel system

- Allow engine to run for several minutes at moderate rpm.
- Switch off ignition.
- Check complete fuel system for leaks.
- If leaks are found although the connections have been tightened to the correct torque, the relevant component must be renewed.
- Road-test vehicle and accelerate with full throttle at least once.
- Then inspect high-pressure section again for leaks.

1.9 Checking vacuum system

Special tools and workshop equipment required

- ◆ Hand vacuum pump -VAS 6213-



Procedure

- Check all vacuum lines in the complete vacuum system for:
 - ◆ Cracks
 - ◆ Traces of animal bites
 - ◆ Kinked or crushed lines
 - ◆ Lines porous or leaking
- Check vacuum line to solenoid valve and from solenoid valve to corresponding component.
- If a fault is stored in the event memory, check the vacuum lines leading to the corresponding component and also check the remaining vacuum lines leading to other components.
- If it is not possible to build up a vacuum with the hand vacuum pump -VAS 6213- or if the vacuum pressure drops again immediately, check the hand vacuum pump and connecting hoses for leaks.

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2 Technical data

3.0 ltr. TFSI engine	
Idling speed	Cannot be adjusted; regulated by idling speed stabilisation
Fuel pressure before high-pressure pump	3.0 ... 6.0 bar
Fuel pressure after high-pressure pump	30 ... 125 bar



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3 Overview of fitting locations

Engine compartment (right-side)

1 - Secondary air pump motor -V101-

- ☐ Fitting location
 ⇒ [page 16](#)

2 - Charge pressure sender - G31- / intake manifold temperature sender -G72-

- ☐ Fitting location
 ⇒ [page 14](#)

3 - Ignition coils for cylinder bank 1

- ☐ Ignition coil 1 with output stage -N70-
- ☐ Ignition coil 2 with output stage -N127-
- ☐ Ignition coil 3 with output stage -N291-
- ☐ Removing and installing
 ⇒ [page 55](#)

4 - Lambda probe -G39-

- ☐ With Lambda probe heater -Z19-
- ☐ Fitting location
 ⇒ [page 12](#)
- ☐ Fitting location of connector ⇒ [page 11](#)
- ☐ Removing and installing
 ⇒ [page 45](#)

5 - Camshaft control valve 1 - N205-

- ☐ Fitting location
 ⇒ [page 14](#)

6 - Electrical connectors

- ☐ Assignment of connectors ⇒ [page 11](#)

7 - Lambda probe after catalytic converter -G130-

- ☐ With Lambda probe 1 heater after catalytic converter -Z29-
- ☐ Fitting location ⇒ [page 12](#)
- ☐ Fitting location of connector ⇒ [page 11](#)
- ☐ Removing and installing ⇒ [page 45](#)

8 - Throttle valve module -J338-

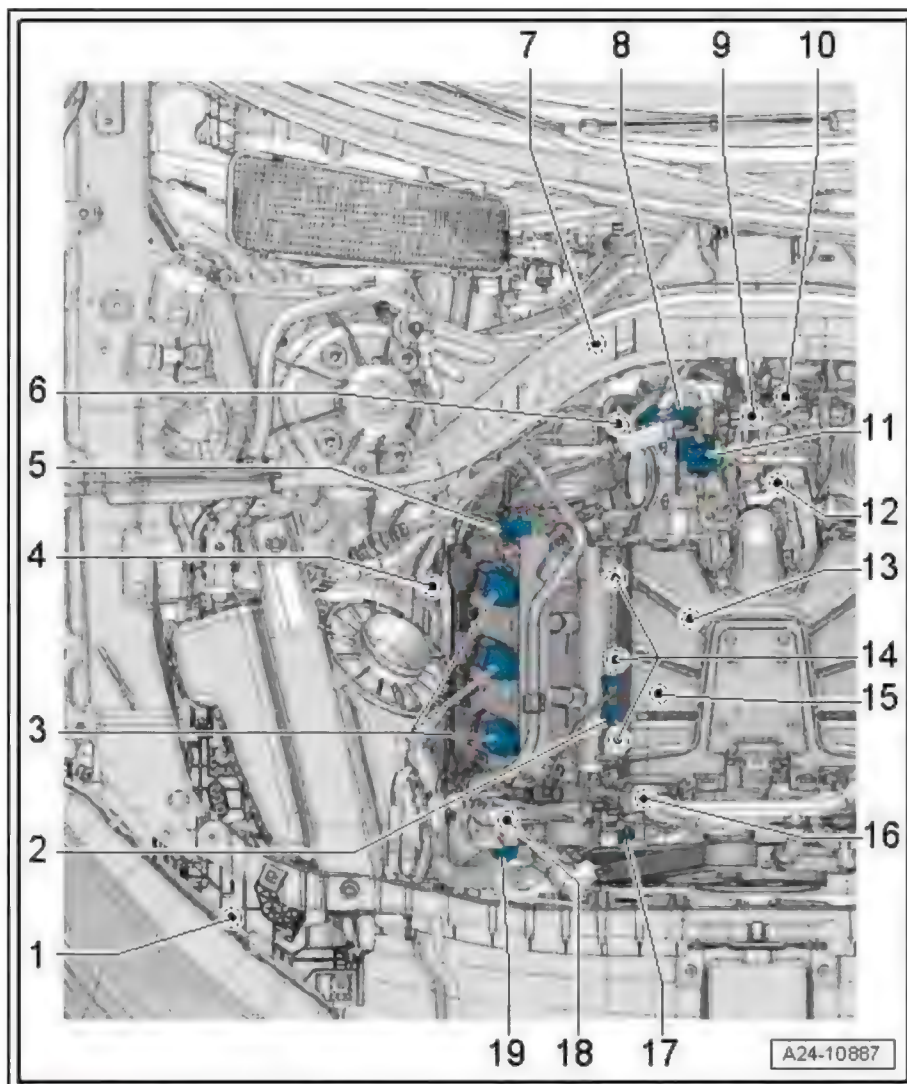
- ☐ Fitting location ⇒ [page 13](#)
- ☐ Removing and installing ⇒ [page 26](#)

9 - Intake air temperature sender -G42- / intake manifold pressure sender -G71-

- ☐ Fitting location ⇒ [page 14](#)
- ☐ Removing and installing ⇒ [page 26](#)

10 - Sender 1 for secondary air pressure -G609-

- ☐ USA version only
- ☐ Fitting location ⇒ [page 17](#)





- 11 - Activated charcoal filter solenoid valve 1 -N80-
- 12 - Engine speed sender -G28-
 - ☐ Fitting location ⇒ [page 16](#)
 - ☐ Removing and installing ⇒ [page 59](#)
- 13 - Knock sensor 1 -G61-
 - ☐ Fitting location ⇒ [page 12](#)
 - ☐ Fitting location of connector ⇒ [page 11](#)
- 14 - Injectors, cylinder bank 1
 - ☐ Injector, cylinder 1 -N30-
 - ☐ Injector, cylinder 2 -N31-
 - ☐ Injector, cylinder 3 -N32-
 - ☐ Removing and installing ⇒ [page 31](#)
- 15 - Temperature sender for engine temperature regulation -G694-
 - ☐ Fitting location ⇒ [page 13](#)
- 16 - Intake manifold flap potentiometer -G336-
 - ☐ Fitting location ⇒ [page 14](#)
- 17 - Hall sender -G40-
 - ☐ Fitting location ⇒ [page 14](#)
- 18 - Fuel metering valve -N290-
 - ☐ Fitting location ⇒ [page 12](#)
- 19 - Fuel pressure sender for low pressure -G410-
 - ☐ Fitting location ⇒ [page 12](#)

Engine compartment (left-side)

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1 - Intake manifold flap potentiometer 2 -G512-

- ☐ Fitting location
 ⇒ [page 14](#)

2 - Coolant temperature sender -G62-

- ☐ Fitting location
 ⇒ [page 15](#)

3 - Fuel pressure sender -G247-

- ☐ Fitting location
 ⇒ [page 13](#)
- ☐ Lubricate threads
- ☐ 22 Nm

4 - Knock sensor 2 -G66-

- ☐ Fitting location
 ⇒ [page 13](#)
- ☐ Fitting location of connector ⇒ [page 11](#)

5 - Injectors, cylinder bank 2

- ☐ Injector, cylinder 4 - N33-
- ☐ Injector, cylinder 5 - N83-
- ☐ Injector, cylinder 6 - N84-
- ☐ Removing and installing
 ⇒ [page 31](#)

6 - Regulating flap control unit -J808-

- ☐ Fitting location
 ⇒ [page 13](#)
- ☐ Removing and installing
 ⇒ [page 28](#)

7 - Secondary air inlet valve -N112-

- ☐ Fitting location ⇒ [page 16](#)

8 - Intake manifold flap valve -N316-

- ☐ Fitting location ⇒ [page 16](#)

9 - Secondary air inlet valve 2 -N320-

- ☐ Fitting location ⇒ [page 16](#)

10 - Electrical connectors

- ☐ Assignment of connectors ⇒ [page 11](#)

11 - Lambda probe 2 after catalytic converter -G131-

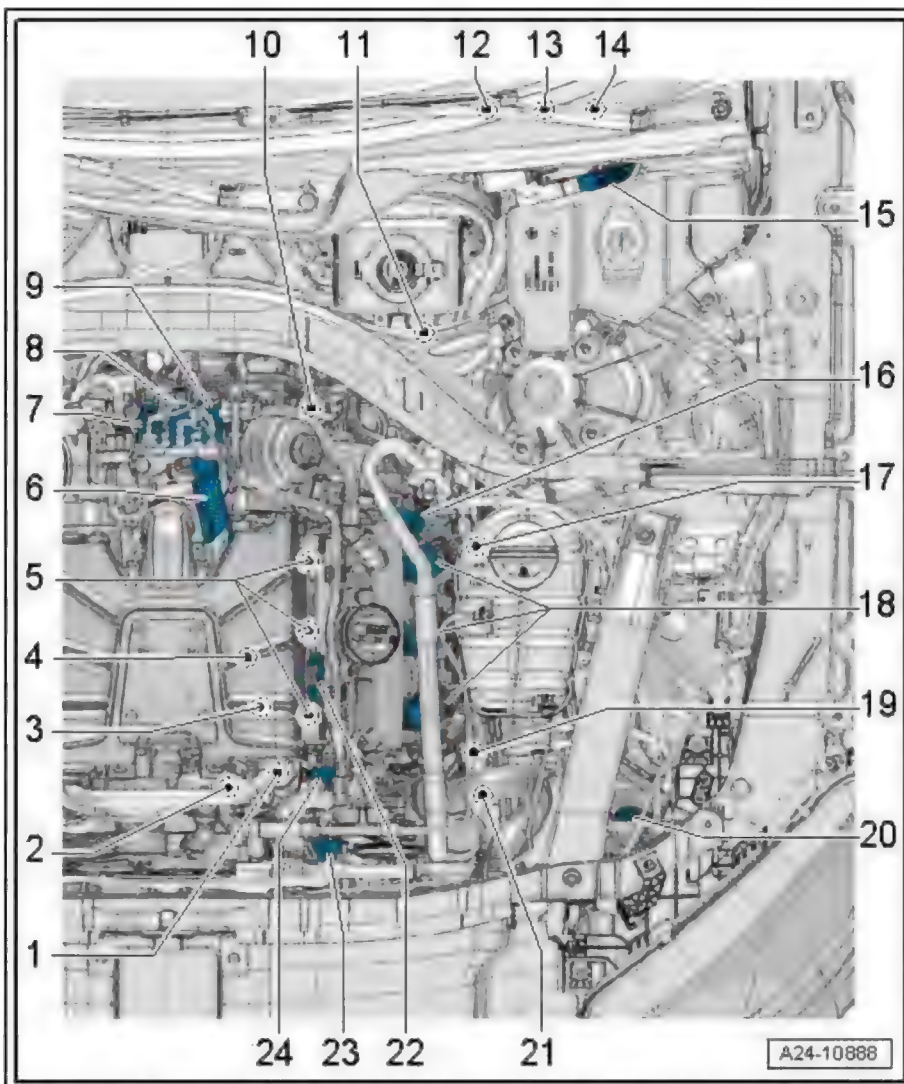
- ☐ With Lambda probe 2 heater after catalytic converter -Z30-
- ☐ Fitting location ⇒ [page 12](#)
- ☐ Fitting location of connector ⇒ [page 11](#)
- ☐ Removing and installing ⇒ [page 46](#)

12 - Engine fault warning lamp

- ☐ In instrument cluster

13 - Accelerator position sender -G79- and accelerator position sender 2 -G185-

- ☐ In accelerator pedal module; fitting location ⇒ [page 11](#)



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14 - Brake light switch -F- / brake pedal switch -F47-

- ☐ Fitting location ⇒ [page 11](#)

15 - Engine control unit -J623-

- ☐ Fitting location ⇒ [page 10](#)
- ☐ Removing and installing ⇒ [page 51](#)

16 - Camshaft control valve 2 -N208-

Fitting location ⇒ [page 15](#)

17 - Lambda probe 2 -G108-

- ☐ With Lambda probe heater 2 -Z28-
- ☐ Fitting location ⇒ [page 12](#)
- ☐ Fitting location of connector ⇒ [page 11](#)
- ☐ Removing and installing ⇒ [page 46](#)

18 - Ignition coils for cylinder bank 2

- ☐ Ignition coil 4 with output stage -N292-
- ☐ Ignition coil 5 with output stage -N323-
- ☐ Ignition coil 6 with output stage -N324-
- ☐ Removing and installing ⇒ [page 55](#)

19 - Valve for oil pressure control -N428-

- ☐ Fitting location ⇒ [page 15](#)

20 - Charge air cooling pump -V188-

- ☐ Fitting location ⇒ [page 15](#)

21 - Continued coolant circulation pump -V51-

- ☐ Equipment version or country-specific version
- ☐ Fitting location ⇒ [page 16](#)

22 - Intake manifold temperature sender 2 -G430- / charge pressure sender 2 -G447-

- ☐ Fitting location ⇒ [page 14](#)

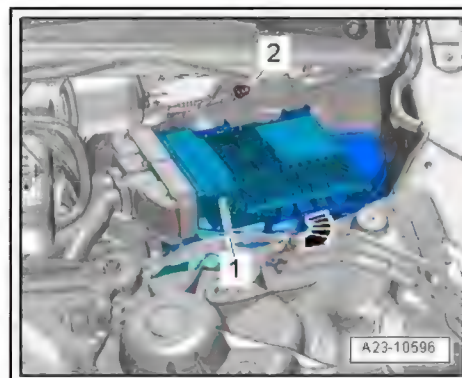
23 - Coolant valve for cylinder head -N489-

24 - Hall sender 2 -G163-

- ☐ Fitting location ⇒ [page 15](#)

Fitting location of engine control unit -J623-

- ◆ -Item 1- in plenum chamber (left-side)



Fitting location of accelerator position sender -G79- / accelerator position sender 2 -G185-

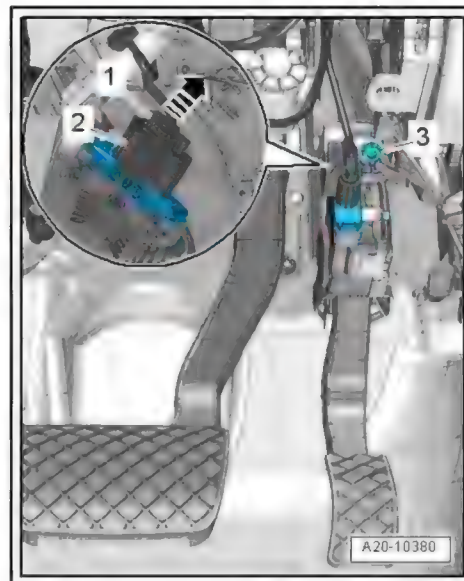
◆ In accelerator pedal module



Note

The accelerator position sender -G79- and accelerator position sender 2 -G185- are integrated in the accelerator pedal module and cannot be renewed individually.

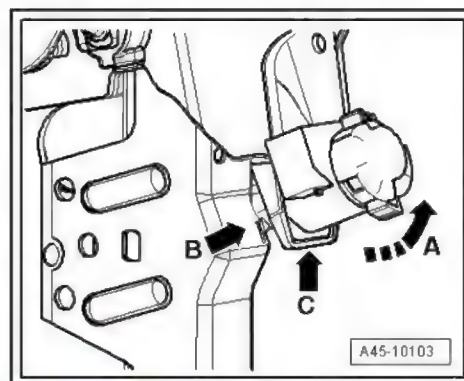
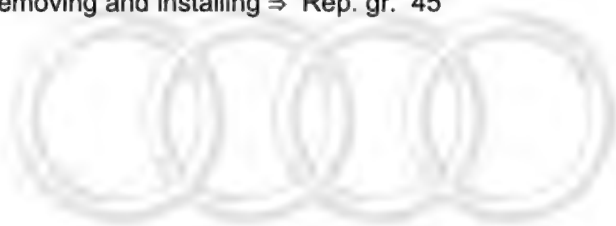
Removing and installing ⇒ Rep. gr. 20



Fitting location of brake light switch -F-

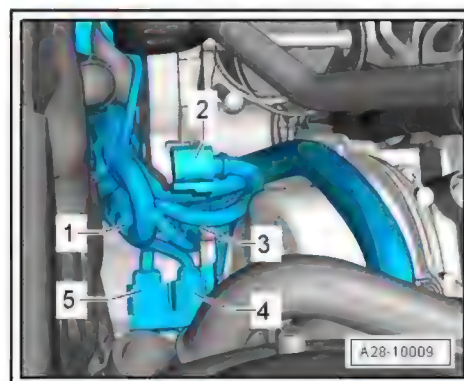
◆ In footwell on brake pedal

Removing and installing ⇒ Rep. gr. 45



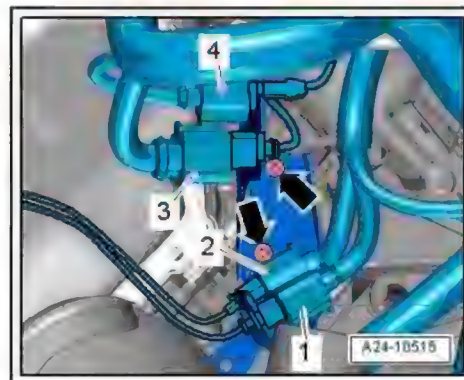
Electrical connectors at rear right of engine

- 1 - For injectors on cylinder bank 1
- 2 - For throttle valve module -J338-
- 3 - For knock sensor 1 -G61-
- 4 - For Lambda probe -G39- with Lambda probe heater -Z19-
- 5 - For Lambda probe after catalytic converter -G130- with Lambda probe 1 heater after catalytic converter -Z29-



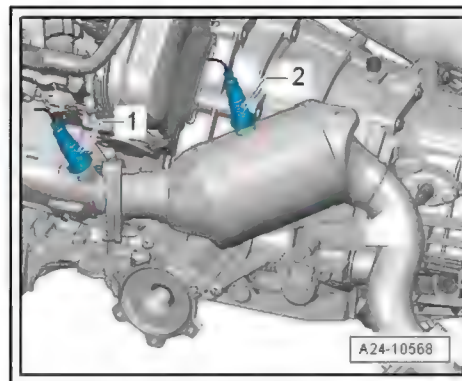
Electrical connectors at rear left of engine

- 1 - For Lambda probe 2 after catalytic converter -G131- with Lambda probe 2 heater after catalytic converter -Z30-
- 2 - For Lambda probe 2 -G108- with Lambda probe heater 2 -Z28-
- 3 - For injectors on cylinder bank 2 and for fuel pressure sender -G247-
- 4 - To knock sensor 2 -G66-

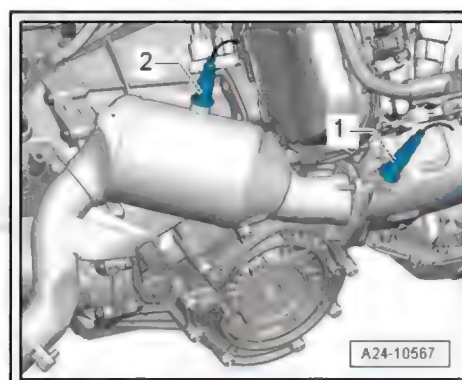


Fitting location of Lambda probes on cylinder bank 1 (right-side)

- 1 - Lambda probe -G39- with Lambda probe heater -Z19-
- 2 - Lambda probe after catalytic converter -G130- with Lambda probe 1 heater after catalytic converter -Z29-

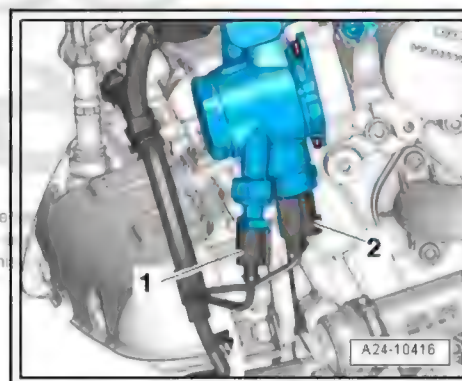

Fitting location of Lambda probes on cylinder bank 2 (left-side)

- 1 - Lambda probe 2 -G108- with Lambda probe heater 2 -Z28-
- 2 - Lambda probe 2 after catalytic converter -G131- with Lambda probe 2 heater after catalytic converter -Z30-


Fitting locations at high-pressure pump

- ◆ On right side of cylinder head

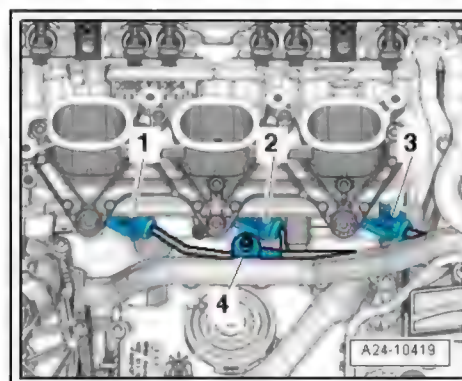
- 1 - Fuel pressure sender for low pressure -G410-
- 2 - Fuel metering valve -N290-



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Fitting locations below intake manifold (bottom section) on cylinder bank 1 (right-side)

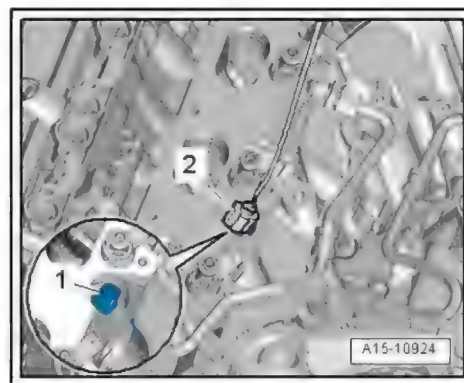
- 1 - Injector, cylinder 1 -N30-
- 2 - Injector, cylinder 2 -N31-
- 3 - Injector, cylinder 3 -N32-
- 4 - Knock sensor 1 -G61-



Fitting location of temperature sender for engine temperature regulation -G694-

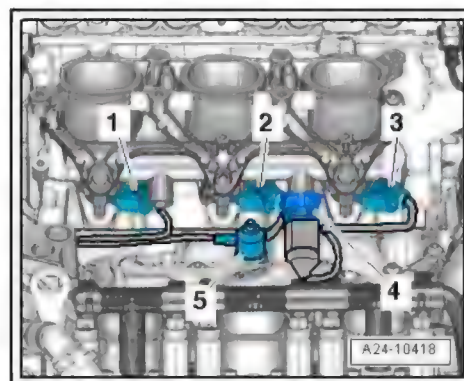
- ◆ -Item 1- below intake manifold (bottom section) on cylinder bank 1 (right-side)

Removing and installing ⇒ Rep. gr. 19



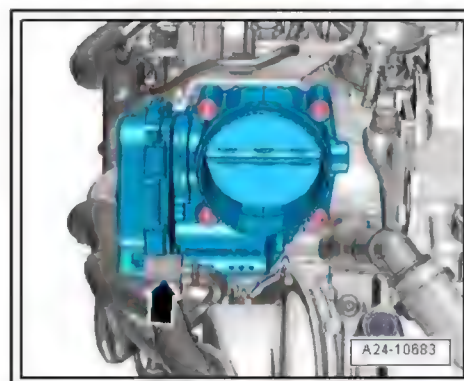
Fitting locations below intake manifold (bottom section) on cylinder bank 2 (left-side)

- 1 - Injector, cylinder 6 -N84-
- 2 - Injector, cylinder 5 -N83-
- 3 - Injector, cylinder 4 -N33-
- 4 - Fuel pressure sender -G247-
- 5 - Knock sensor 2 -G66-



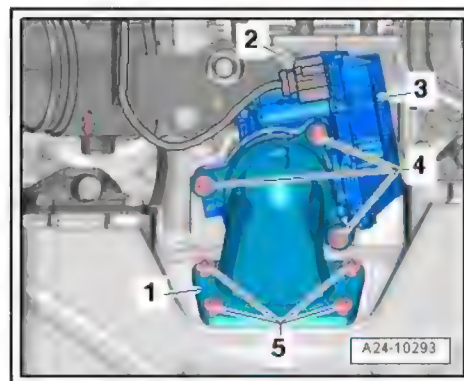
Fitting location of throttle valve module -J338-

- ◆ At rear of supercharger



Fitting location of regulating flap control unit -J808-

- ◆ -Item 3- at rear of supercharger



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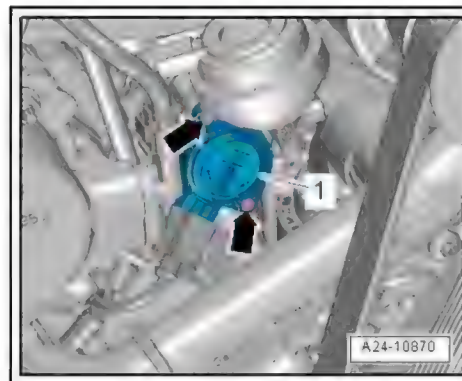
Fitting location of intake manifold flap potentiometer -G336-

- ◆ -Item 1- at front of intake manifold (right-side)



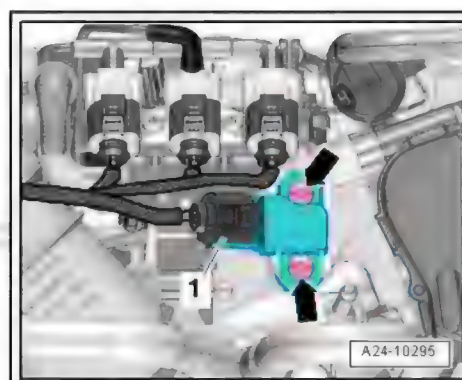
Note

The fitting location of the intake manifold flap potentiometer 2 - G512- is symmetrically reversed.



Fitting location of intake air temperature sender -G42- / intake manifold pressure sender -G71-

- ◆ At rear of supercharger with charge air cooler
- 1 - Electrical connector for intake air temperature sender - G42- / intake manifold pressure sender -G71-



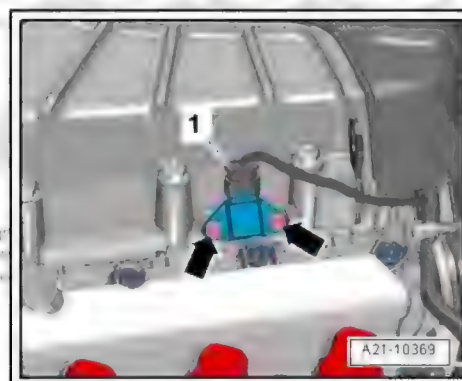
Fitting location of charge pressure sender -G31- / intake manifold temperature sender -G72-

- ◆ At right side of supercharger with charge air cooler
- 1 - Electrical connector for charge pressure sender -G31- / intake manifold temperature sender -G72-



Note

Intake manifold temperature sender 2 -G430- / charge pressure sender 2 -G447- are located symmetrically reversed.

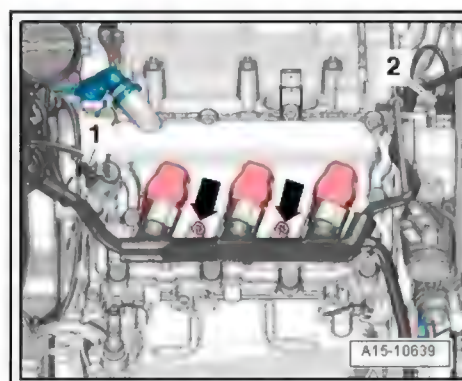


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JDI AG

Removing and installing ⇒ Rep. gr. 21

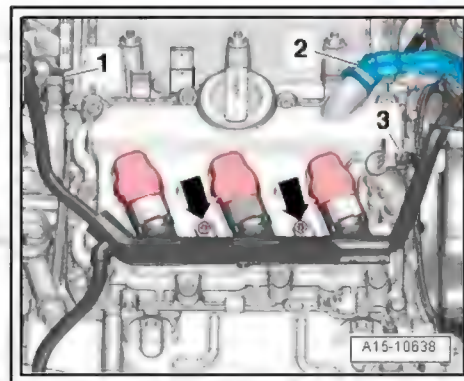
Fitting location of Hall sender and camshaft control valve on cylinder bank 1 (right-side)

- 1 - Camshaft control valve 1 -N205-
- 2 - Hall sender -G40-



Fitting location of Hall sender and camshaft control valve on cylinder bank 2 (left-side)

- 1 - Hall sender 2 -G163-
- 2 - Camshaft control valve 2 -N208-

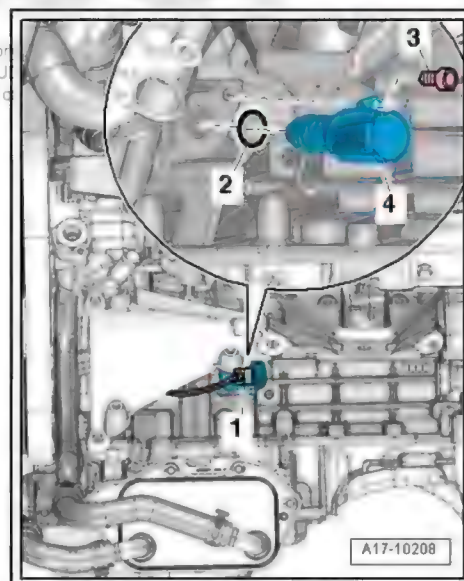


Fitting location of valve for oil pressure control -N428-

- ◆ -Item 4- at bottom left of engine

Removing and installing ⇒ Rep. gr. 17

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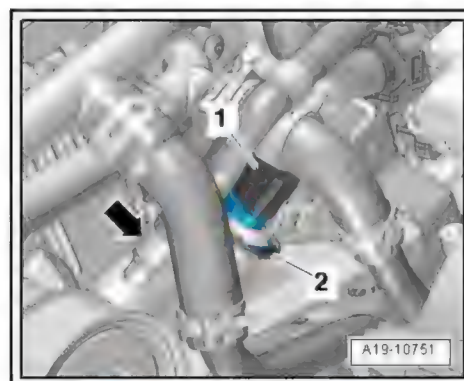


Fitting location of coolant temperature sender -G62-

- ◆ At front of engine

- 1 - Electrical connector for coolant temperature sender -G62-

Removing and installing ⇒ Rep. gr. 19

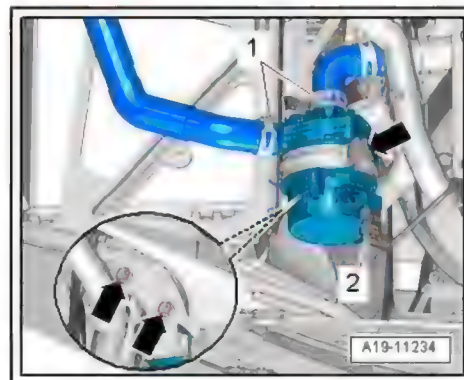


Fitting location of charge air cooling pump -V188-

- ◆ In wheel housing (front left)

- 2 - Electrical connector for charge air cooling pump -V188-

Removing and installing ⇒ Rep. gr. 19

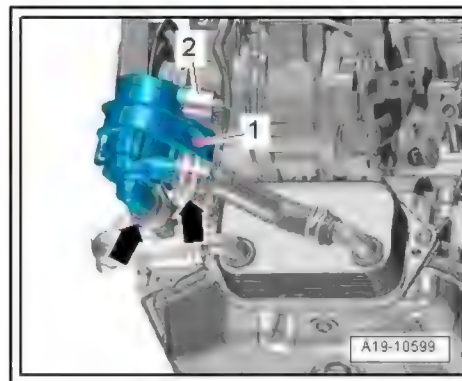


Fitting location of continued coolant circulation pump -V51-

- ◆ At front left of engine

2 - Electrical connector for continued coolant circulation pump - V51-

Removing and installing ⇒ Rep. gr. 19

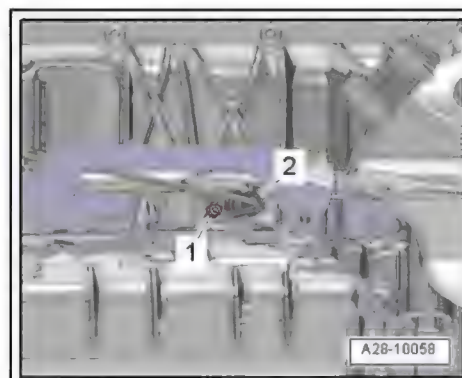


Fitting location of engine speed sender -G28-

- ◆ At bottom of timing chain cover (bottom)

2 - Electrical connector for engine speed sender -G28-

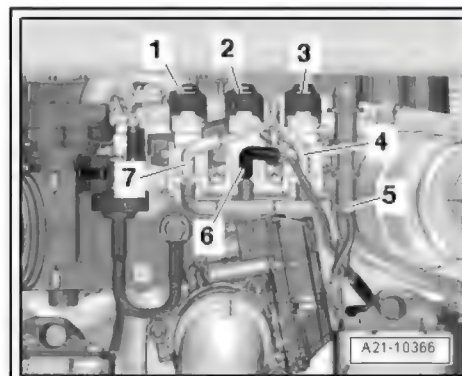
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Fitting location of secondary air inlet valves and intake manifold flap valve -N316-

- ◆ At rear of supercharger with charge air cooler

- 1 - Secondary air inlet valve -N112-
- 2 - Intake manifold flap valve -N316-
- 3 - Secondary air inlet valve 2 -N320-

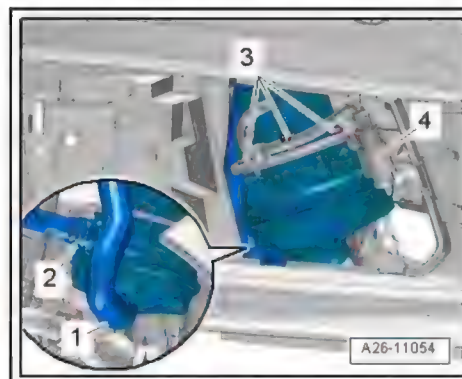


Fitting location of secondary air pump motor -V101-

- ◆ In wheel housing (front right)

4 - Electrical connector for secondary air pump motor -V101-

Removing and installing ⇒ Rep. gr. 26

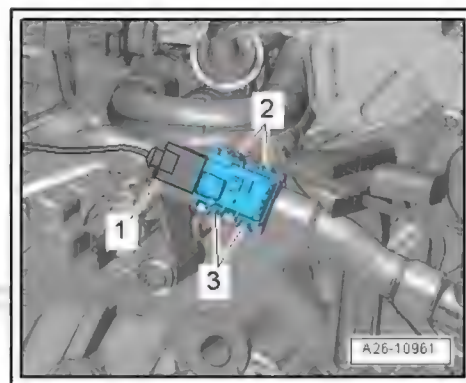


Fitting location of sender 1 for secondary air pressure -G609-

◆ At rear of engine

1 - Electrical connector for sender 1 for secondary air pressure
-G609-

Removing and installing ⇒ Rep. gr. 26



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4 Air cleaner

Overview

- ◆ ⇒ „4.1 Air cleaner - exploded view“, page 18
- ◆ ⇒ „4.2 Removing and installing engine cover panels“, page 19
- ◆ ⇒ „4.3 Removing and installing air filter element“, page 19
- ◆ ⇒ „4.4 Removing and installing air cleaner housing“, page 20

4.1 Air cleaner - exploded view

1 - Air duct

- ☐ Clean out salt deposits, dirt and leaves, etc.

2 - Sealing element

3 - Retainer

- ☐ For air cleaner housing

4 - Air cleaner housing

- ☐ Clean out salt deposits, dirt and leaves, etc.
- ☐ Removing and installing
⇒ „4.4 Removing and installing air cleaner housing“, page 20

5 - Air filter element

- ☐ Use genuine air filter element ⇒ Electronic parts catalogue
- ☐ Change intervals ⇒ Maintenance tables
- ☐ Removing and installing
⇒ page 19

6 - Air pipe

- ☐ Tightening torque for screw-type clips
⇒ page 19

7 - Cover

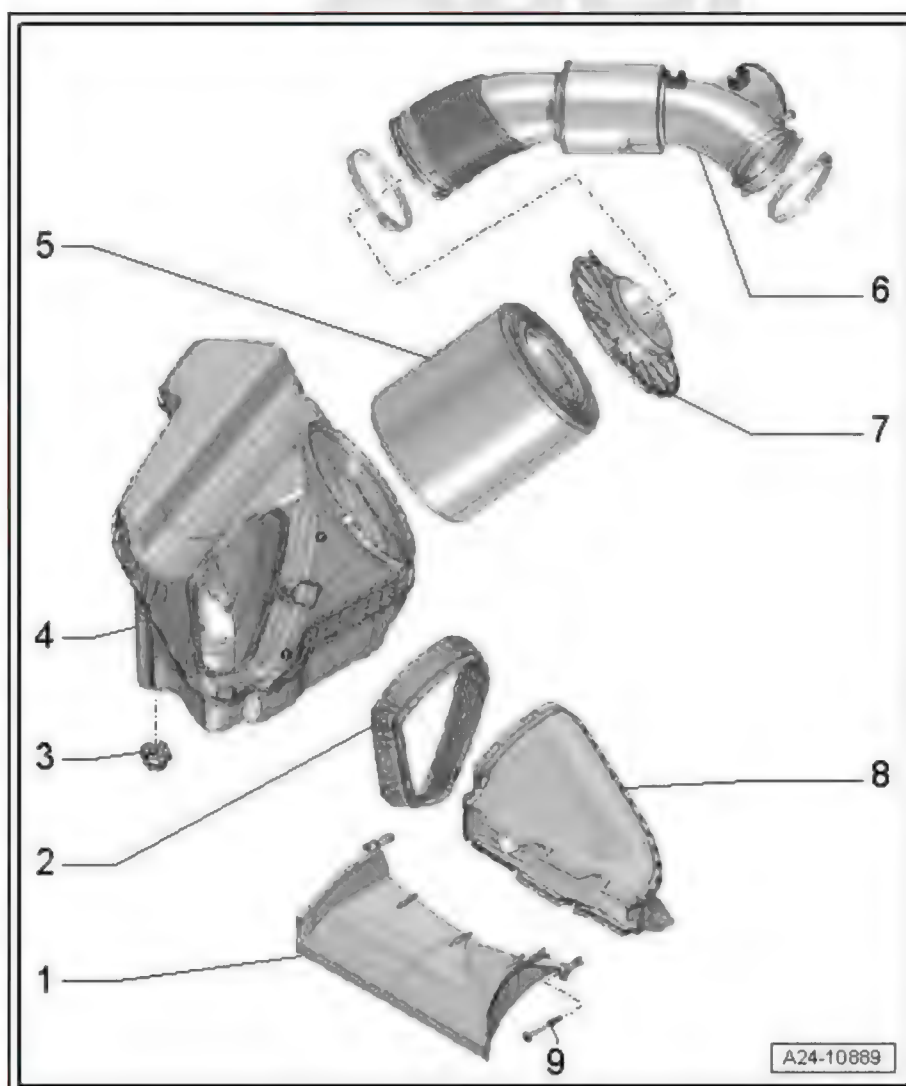
- ☐ For air cleaner housing
- ☐ Clean out salt deposits and dirt
- ☐ Removing and installing
⇒ „4.3 Removing and installing air filter element“, page 19

8 - Air duct

- ☐ Clean out salt deposits, dirt and leaves, etc.

9 - Bolt

- ☐ 1.5 Nm

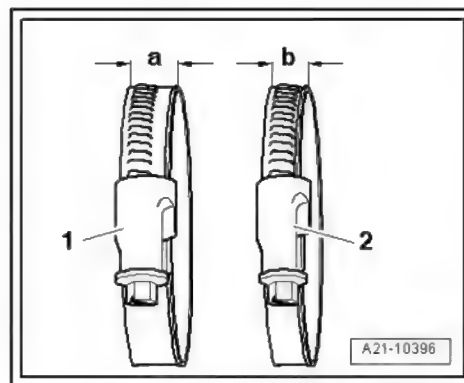


Installing air pipes and hoses with screw-type clips



Note

- ◆ *Hose connections and air pipes and hoses must be free of oil and grease before assembly.*
- ◆ *Secure all hose connections with the correct type of screw-type clips (same as original equipment) ⇒ Electronic parts catalogue .*
- ◆ *To ensure that the air hoses can be properly secured at their connections, spray rust remover onto the worm thread of used hose clips before installing.*



Tightening torque for

- 1 - Screw-type clip -a- = 13 mm wide: 5.5 Nm
- 2 - Screw-type clip -b- = 9 mm wide: 3.4 Nm

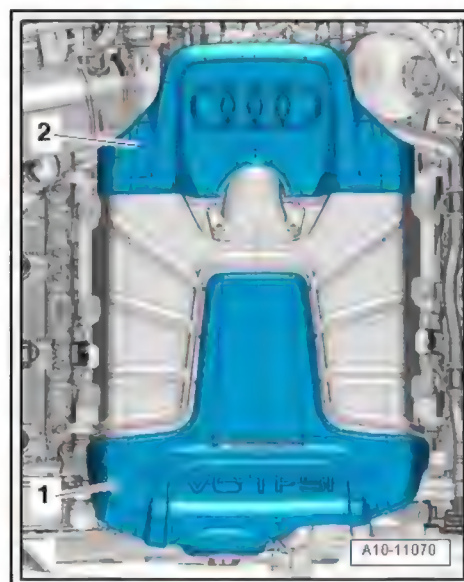
4.2 Removing and installing engine cover panels

Removing

- Lift off engine cover panel -1- or engine cover panel -2-.

Installing

- To avoid damage, do not strike the engine cover panel with your fist or with any kind of tool.
- Position engine cover panel on engine and press it into retaining clips with both hands.



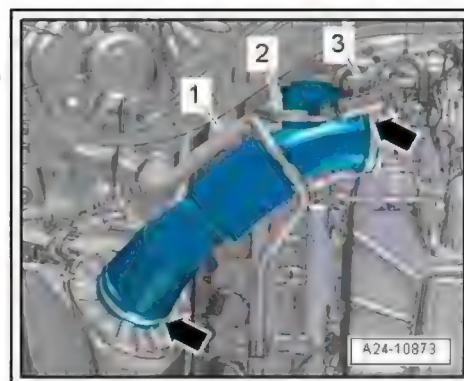
4.3 Removing and installing air filter element

Special tools and workshop equipment required

- ◆ Silicone-free lubricant

Removing

- Move fuel hose -1- and hose -2- leading to activated charcoal filter clear at air pipe.
- Detach vacuum hose -3- from connection on air pipe.
- Release hose clips -arrows- and remove air pipe.



- Release catch -1-, turn cover for air cleaner housing in anti-clockwise direction -arrow A- and detach.
- Take out air filter element.

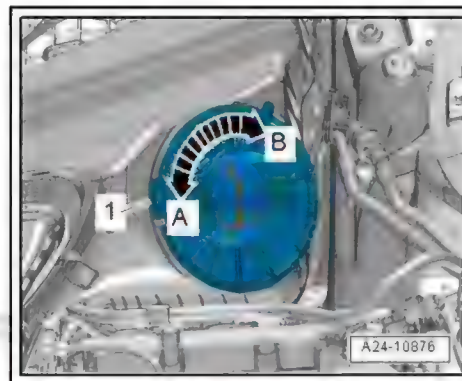
Installing

- Tightening torques
⇒ „4.1 Air cleaner - exploded view“, page 18

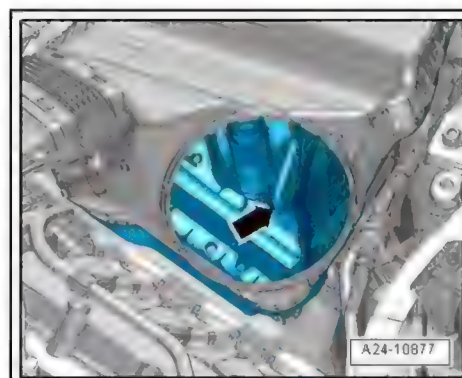


Note

- ◆ Always use genuine part for air filter element.
- ◆ The air cleaner housing MUST be clean.
- ◆ Hose connections and hoses for charge air system must be free of oil and grease before assembly.
- ◆ Use a silicone-free lubricant when installing the air hoses.
- ◆ Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .
- ◆ To prevent malfunctions, cover all critical parts of the engine air intake tract (intake pipes, etc.) with a clean cloth when blowing out the air cleaner housing with compressed air.
- ◆ Observe environmental requirements for disposal.

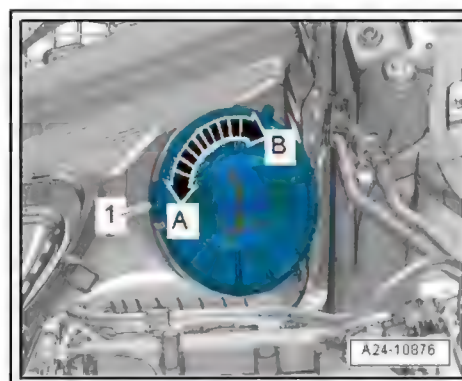


- Clean salt residue, dirt and leaves out of air cleaner housing using a vacuum cleaner.
- Blow out water drain -arrow- on air cleaner housing with compressed air.
- Check for dirt and leaves in air duct going from lock carrier to air cleaner housing.



- When installing air filter element, check that it is properly centred in retainer in air cleaner housing.
- Carefully fit cover on air cleaner housing without using force.
- Turn cover in clockwise direction -arrow B- until catch -1- engages.
- Make sure that air hose is securely fitted on air cleaner housing.

The remaining installation steps are carried out in the reverse sequence.



4.4 Removing and installing air cleaner housing

Removing

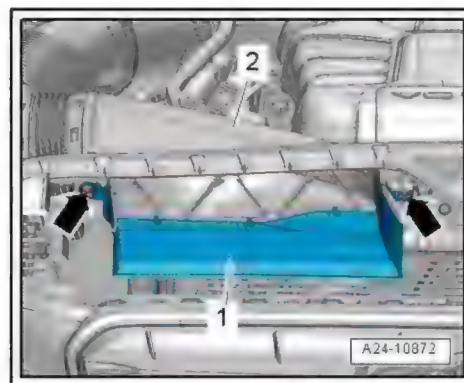
- Remove lock carrier cover ⇒ Rep. gr. 63 .

- Remove bolts -arrows- and detach air duct -2-.

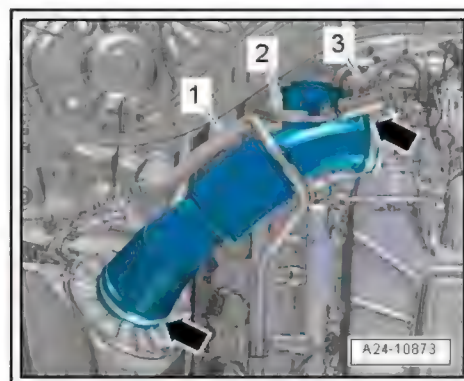


Note

Disregard -item 1-.



- Move fuel hose -1- and hose -2- leading to activated charcoal filter clear at air pipe.
- Detach vacuum hose -3- from connection on air pipe.
- Release hose clips -arrows- and remove air pipe.



- Lift off air cleaner housing -1-.
- Press release tabs and disconnect secondary air hose -arrow-.

Installing

- Tightening torque
 ⇒ „4.1 Air cleaner - exploded view“, page 18

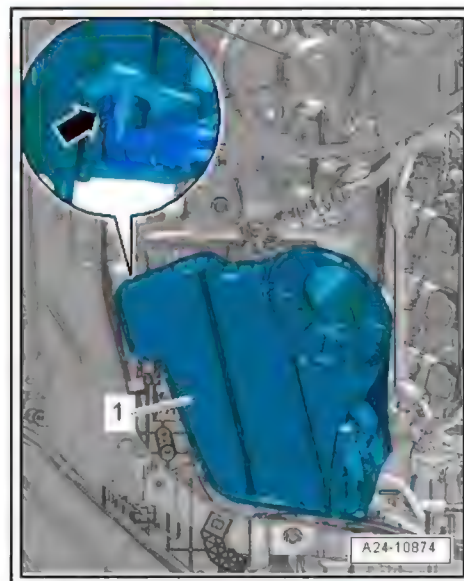


Note

- ◆ *The air cleaner housing MUST be clean.*
- ◆ *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*
- ◆ *To prevent malfunctions, cover all critical parts of the engine air intake tract (intake pipes, etc.) with a clean cloth when blowing out the air cleaner housing with compressed air.*

Remaining installation steps are carried out in reverse sequence; note the following:

- Install lock carrier cover ⇒ Rep. gr. 63 .



5 Intake manifold (bottom section), fuel rail, injectors

Overview

- ◆ ⇒ [„5.1 Intake manifold \(bottom section\), fuel rail, injector - exploded view“, page 23](#)
- ◆ ⇒ [„5.2 Removing and installing intake air temperature sender G42 / intake manifold pressure sender G71“, page 26](#)
- ◆ ⇒ [„5.3 Removing and installing throttle valve module J338“, page 26](#)
- ◆ ⇒ [„5.5 Removing and installing regulating flap control unit J808“, page 28](#)
- ◆ ⇒ [„5.6 Removing and installing intake manifold \(bottom section\) with fuel rail“, page 29](#)
- ◆ ⇒ [„5.7 Removing and installing injectors“, page 31](#)
- ◆ ⇒ [„5.7 Removing and installing injectors“, page 31](#)
- ◆ ⇒ [„5.8 Checking fuel pressure and residual pressure \(up to high-pressure pump\)“, page 34](#)

5.1 Intake manifold (bottom section), fuel rail, injector - exploded view



Illustration shows components for cylinder bank 2 (left-side).

1 - Bolts

- ☐ 2.5 Nm

2 - Intake manifold flap potentiometer 2 -G512-

- ☐ Cylinder bank 1 (right-side): intake manifold flap potentiometer - G336-

3 - Seal

- ☐ Renew if damaged
- ☐ When renewing lever out with screwdriver
- ☐ Press in by hand

4 - Sleeve

5 - Fuel pressure sender - G247-

- ☐ Lubricate threads
- ☐ 22 Nm

6 - Bracket

7 - Bolt

- ☐ 9 Nm

8 - High-pressure pipe

- ☐ Reducing fuel pressure in high-pressure section of injection system
⇒ [page 4](#)
- ☐ Removing and installing
⇒ [page 39](#)
- ☐ Do not alter shape
- ☐ Check for damage before re-installing

- ☐ To loosen and tighten high-pressure pipe, counterhold at pipe connection
- ☐ Lubricate threads of union nuts with fuel
- ☐ 25 Nm

9 - Bolt

- ☐ 9 Nm

10 - Nut

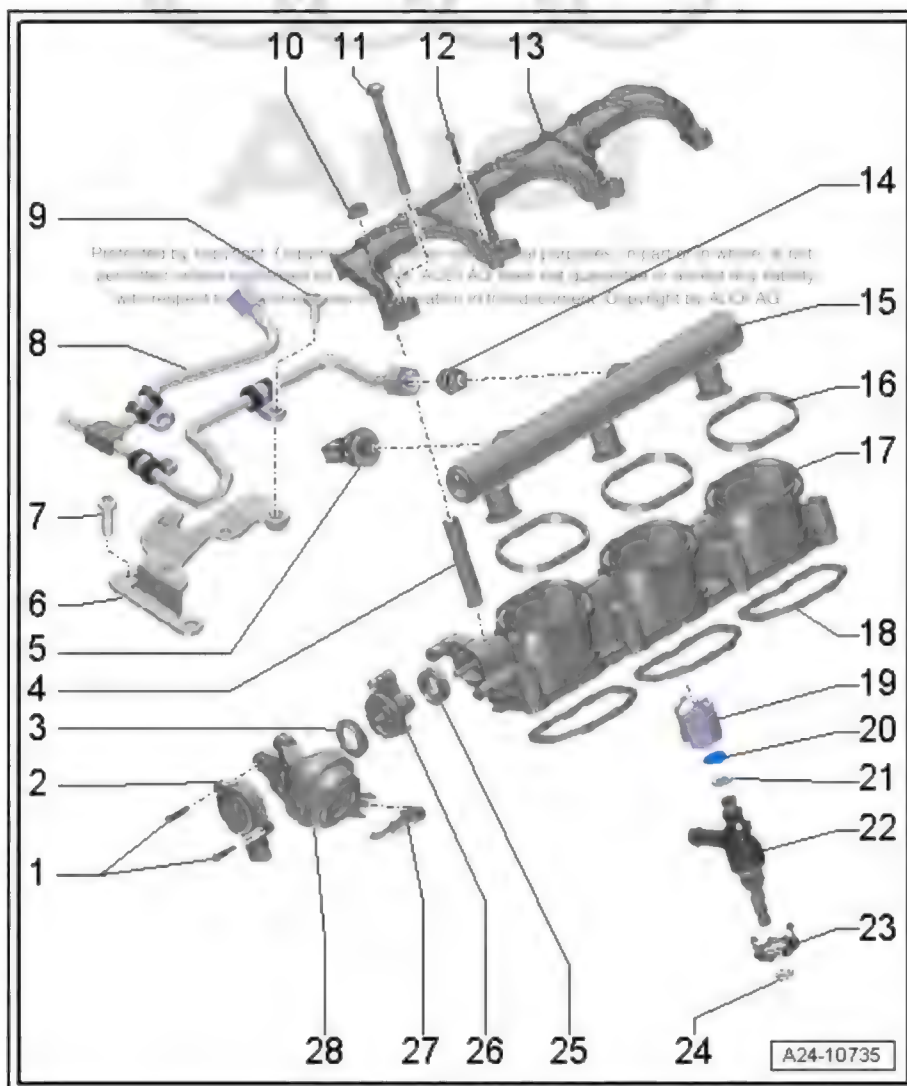
- ☐ Tightening torque and sequence ⇒ [page 25](#)

11 - Bolt

- ☐ Tightening torque and sequence ⇒ [page 25](#)

12 - Bolt

- ☐ 2.5 Nm





13 - Retaining clip

- ☐ For fuel rail

14 - Threaded connection

- ☐ 40 Nm

15 - Fuel rail

16 - Seal

- ☐ Renew

17 - Intake manifold (bottom section)

- ☐ Removing and installing ⇒ [page 29](#)

18 - Seal

- ☐ Renew

19 - Support ring

- ☐ Make sure it is correctly seated
- ☐ Via this support ring, the fuel rail exerts the force which holds the injector in the cylinder head

20 - O-ring

- ☐ Renew
- ☐ Lubricate lightly with clean engine oil

21 - Spacer ring

- ☐ Renew if damaged

22 - Injector

Removing and installing ⇒ [page 31](#)

23 - Sealing element

24 - Combustion chamber ring seal

- ☐ Renewing ⇒ [„5.7 Removing and installing injectors“, page 31](#)

25 - Seal

- ☐ Renew if damaged
- ☐ When renewing lever out with screwdriver
- ☐ Press in by hand

26 - Operating lever

- ☐ For vacuum unit

27 - Vacuum hose

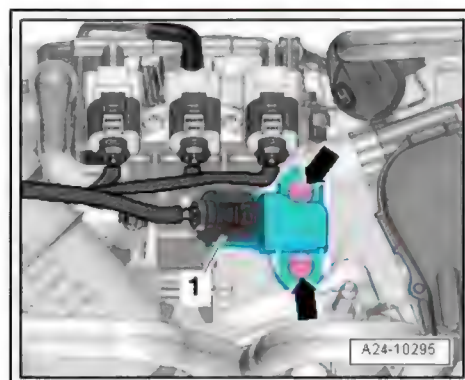
- ☐ To intake manifold flap valve -N316-

28 - Vacuum unit

- ☐ For actuating intake manifold flaps

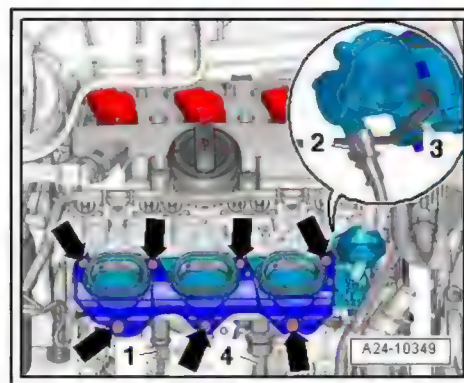
Intake air temperature sender -G42- / intake manifold pressure sender -G71- - tightening torque

- Tighten bolts -arrows- to 10 Nm.



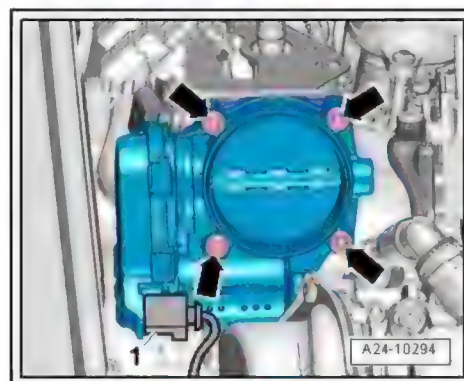
Intake manifold (bottom section) - tightening torque

- Tighten bolts and nuts -arrows- in stages and in diagonal sequence; final torque 9 Nm.



Throttle valve module -J338- - tightening torque

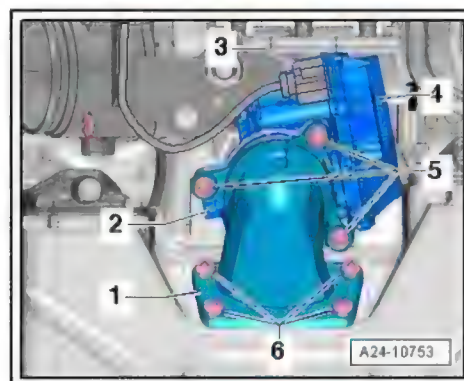
- Tighten bolts -arrows- in diagonal sequence to 10 Nm.



Regulating flap control unit -J808- - tightening torque and sequence

- Tighten bolts in 3 stages as follows:

Stage	Bolts	Tightening torque
1.	-5, 6-	Screw in bolts by hand until they make contact
2.	-6-	10 Nm
3.	-5-	10 Nm



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5.2 Removing and installing intake air temperature sender -G42- / intake manifold pressure sender -G71-

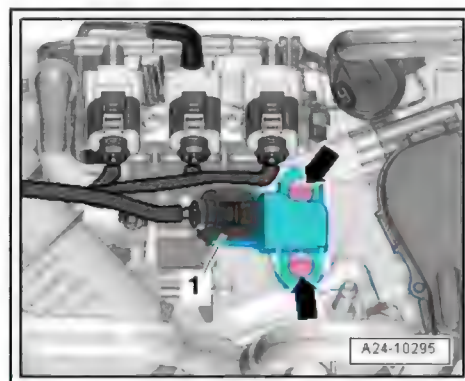
Removing

- Remove engine cover panel (rear) ⇒ [page 19](#) .
- Unplug electrical connector -1-.
- Unscrew bolts -arrows- and detach intake air temperature sender -G42- / intake manifold pressure sender -G71- .

Installing

Installation is carried out in the reverse order; note the following:

- Tightening torque
⇒ [Fig. "Intake air temperature sender -G42- / intake manifold pressure sender -G71- - tightening torque"](#) , [page 24](#)



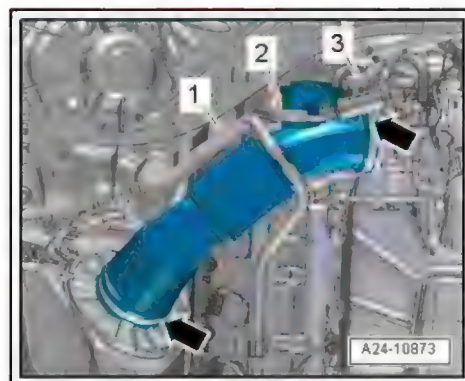
Note

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5.3 Removing and installing throttle valve module -J338-

Removing

- Remove engine cover panel (rear) ⇒ [page 19](#) .
- Move clear fuel line -1- and line -2- going to activated charcoal filter at air pipe.
- Detach vacuum hose -3- from connection on air pipe.
- Release hose clips -arrows- and remove air pipe.



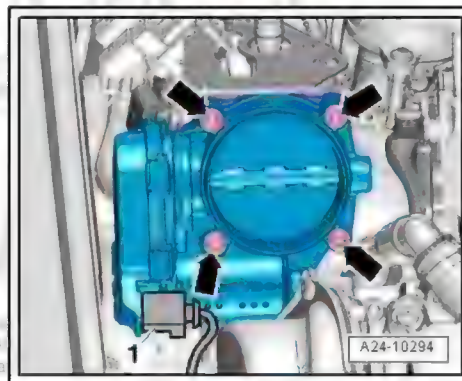
- Unplug electrical connector -1-.
- Remove bolts -arrows- and detach throttle valve module - J338- with intermediate flange.



Caution

Risk of irreparable damage to engine.

- ◆ *Block off the intake port with a clean cloth to prevent small items from dropping into the supercharger.*



Installing

Installation is carried out in the reverse order; note the following:

- Tightening torques
⇒ Fig. „Throttle valve module -J338- - tightening torque“ ,
page 25
- Tightening torques
⇒ Fig. „Installing air pipes and hoses with screw-type clips“ ,
page 19



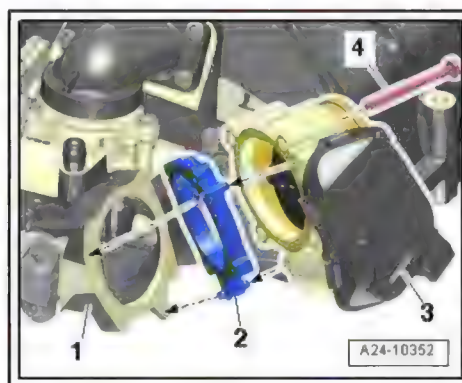
Note

- ◆ *Fit new O-rings.*
- ◆ *Hose connections and air pipes and hoses must be free of oil and grease before assembly.*
- ◆ *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*
- ◆ *To secure the air hoses at their connections, spray rust remover onto the worm thread of the used hose clips before installing.*

- Insert intermediate flange -2- with O-rings into supercharger -1- -left arrows-.
- Fit throttle valve module -J338- -item 3- on intermediate flange -right arrows-.
- Tighten bolts -4- for throttle valve module ⇒ page 25 .

If a new throttle valve module -J338- has been installed:

- Erase learnt values and adapt engine control unit -J623- to throttle valve module -J338- . Use ⇒ Vehicle diagnostic tester.



5.4 Cleaning throttle valve module -J338-



Note

- ◆ *If a new engine control unit -J623- is installed, it must be adapted to the throttle valve module.*
- ◆ *Take care not to scratch the throttle valve housing when cleaning it.*

Special tools and workshop equipment required

- ◆ Acetone (commercially available)

- ◆ Brush

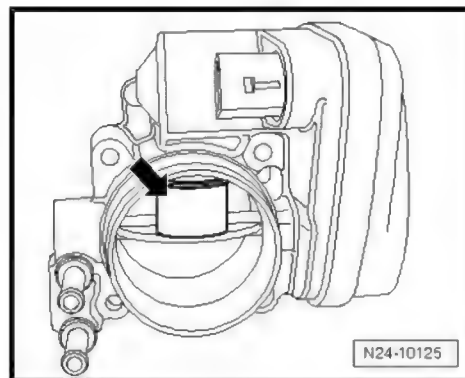
Procedure

- Remove throttle valve module -J338- ➔ [page 26](#) .
- Open throttle valve by hand and block it in the open position with a suitable object (e.g. plastic or wooden wedge) -arrow-.

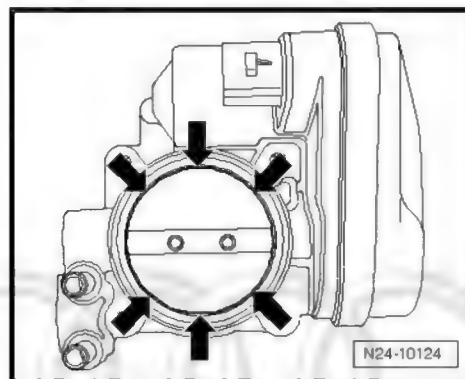


WARNING

Acetone is highly flammable. Please observe all accident prevention regulations and safety precautions when handling flammable liquids. Do not use compressed air when cleaning the throttle valve. Wear safety goggles and protective clothing to avoid possible injury and skin contact.



- Clean throttle valve housing thoroughly, especially around the points -arrows- where the throttle valve closes, using commercially available acetone and a small brush.
- Wipe out throttle valve housing with a lint-free cloth.
- Allow acetone to evaporate completely and re-install throttle valve module after cleaning.
- Install throttle valve module -J338- ➔ [page 26](#) .
- Erase learnt values and adapt engine control unit -J623- to throttle valve module. Use ➔ Vehicle diagnostic tester.



5.5 Removing and installing regulating flap control unit -J808-

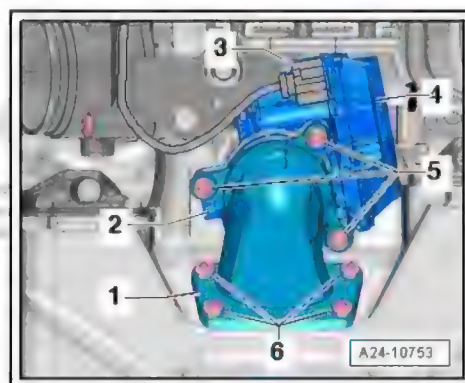
Removing

- Remove engine cover panel (rear) ➔ [page 19](#) .
- Unplug electrical connector -3-.
- Remove bolts -5- and -6-.
- Detach bypass elbow -1- with adapter (intermediate flange) -2- and regulating flap control unit -J808- -4-.

Installing

Installation is carried out in the reverse order; note the following:

- Tightening torque
➔ [Fig. „Regulating flap control unit -J808- - tightening torque and sequence“](#) , [page 25](#)



Note

Fit new O-rings.

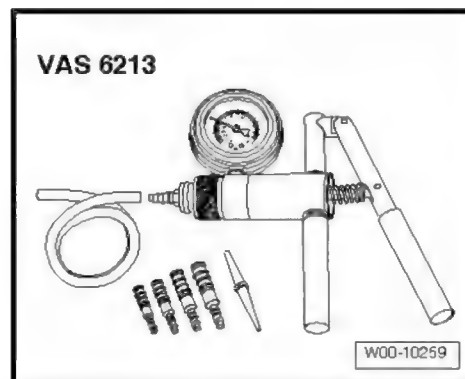
If a new regulating flap control unit -J808- has been installed:

- Erase learnt values and adapt engine control unit -J623- to regulating flap control unit -J808- . Use ➔ Vehicle diagnostic tester.

5.6 Removing and installing intake manifold (bottom section) with fuel rail

Special tools and workshop equipment required

- ◆ Tool inserts -V.A.G 1331/2-
- ◆ Hand vacuum pump -VAS 6213-



Removing



Note

The removal and installation procedures are described for cylinder bank 2 (left-side).

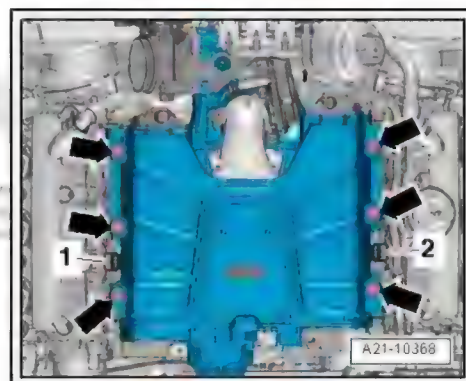


WARNING

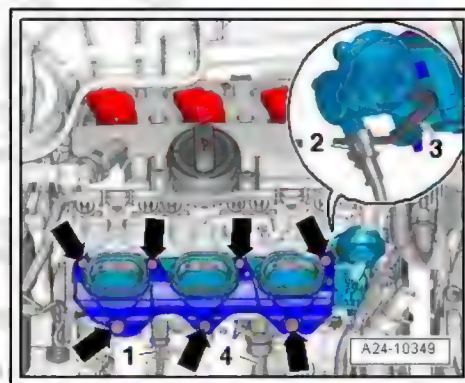
The fuel system operates at extremely high pressure. This can cause injury.

- ◆ *The fuel pressure in the high-pressure section of the injection system must be reduced to a residual pressure prior to opening the system.*

- Reduce fuel pressure in high-pressure section of injection system ➔ [page 4](#) .
- Remove supercharger ➔ Rep. gr. 21 .



- Push vacuum hoses to one side.
- Unplug electrical connector -4- at fuel pressure sender - G247- .
- Unscrew union nut -1- (counterhold threaded connection).
- Remove bolts and nuts -arrows- and detach intake manifold (bottom section) with fuel rail.
- Unplug electrical connector -2- at intake manifold flap potentiometer and pull off vacuum hose -3-.



Caution

Risk of irreparable damage to engine.

- ◆ Block off the intake ports with clean cloths to prevent small objects from dropping into the engine through the intake ports in the cylinder heads.

Installing

Installation is carried out in the reverse order; note the following:

Tightening torques

- ⇒ ["5.1 Intake manifold \(bottom section\), fuel rail, injector - exploded view", page 23](#) .
- ⇒ [Fig. "Intake manifold \(bottom section\) - tightening torque", page 25](#) .



Note

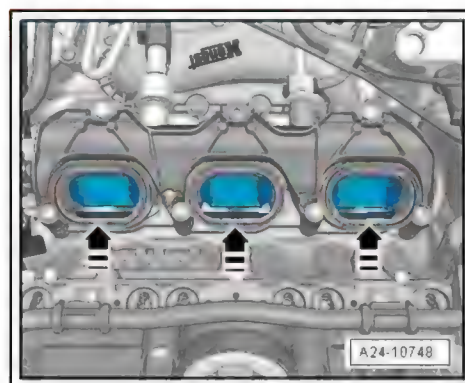
- ◆ Renew seals and O-rings.
- ◆ Lubricate O-rings of injectors lightly with clean engine oil.



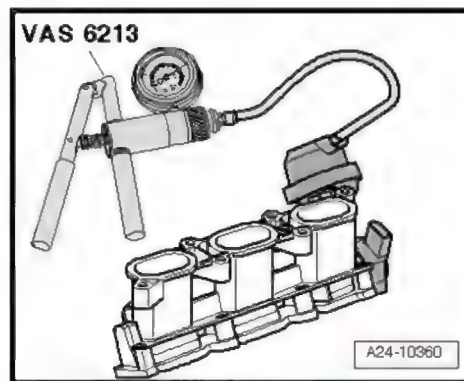
Caution

Risk of damage to intake manifold flaps.

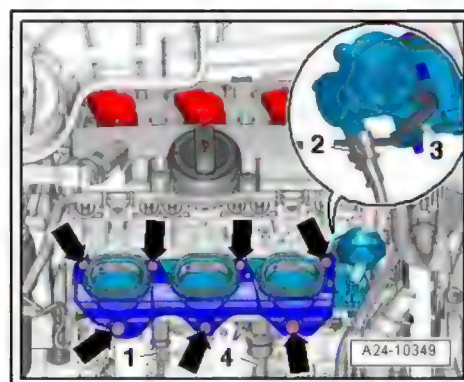
- ◆ To prevent the intake manifold flaps from catching on the guide plates in the cylinder head, the flaps must be in the output position -arrows- (intake channel fully open) when the intake manifold (bottom section) is installed.



- Connect hand vacuum pump -VAS 6213- to vacuum unit for actuating intake manifold flaps, as shown in illustration.
- Use vacuum pump to generate a vacuum.
- This will cause the intake manifold flaps to open.
- Press intake manifold (bottom section) with fuel rail evenly on to injectors.



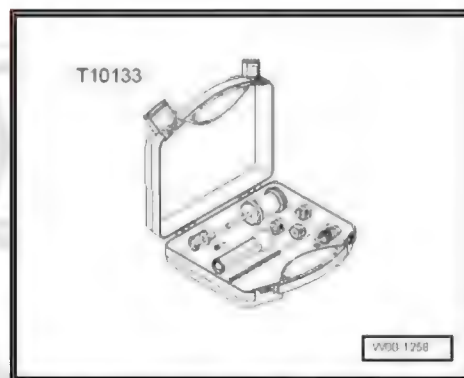
- Tighten bolts and nuts for intake manifold (bottom section) ⇒ [page 25](#) .
- Disconnect hand vacuum pump from vacuum unit for actuating intake manifold flaps.
- Install high-pressure pipe ⇒ [page 39](#) .
- Install supercharger ⇒ Rep. gr. 21 .



5.7 Removing and installing injectors

Special tools and workshop equipment required

- ◆ Tool set for FSI engines -T10133-



Removing



WARNING

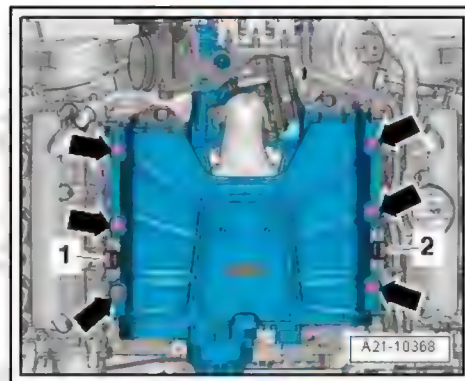
The fuel system operates at extremely high pressure. This can cause injury.

- ◆ *The fuel pressure in the high-pressure section of the injection system must be reduced to a residual pressure prior to opening the system.*

- Reduce fuel pressure in high-pressure section of injection system ⇒ [page 4](#) .

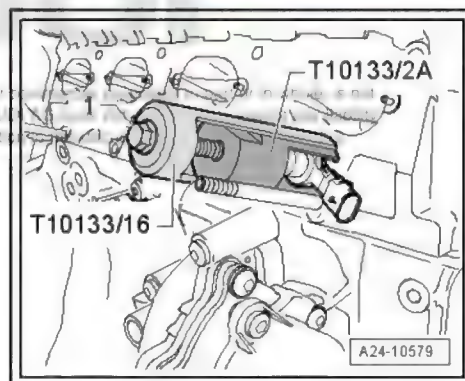
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- Remove supercharger ⇒ Rep. gr. 21 .
- Remove corresponding intake manifold (bottom section)
⇒ [page 29](#) .



- Apply puller -T10133/2A- to groove on injector.
- Attach removal tool -T10133/16- and pull out injector by turning bolt -1-.

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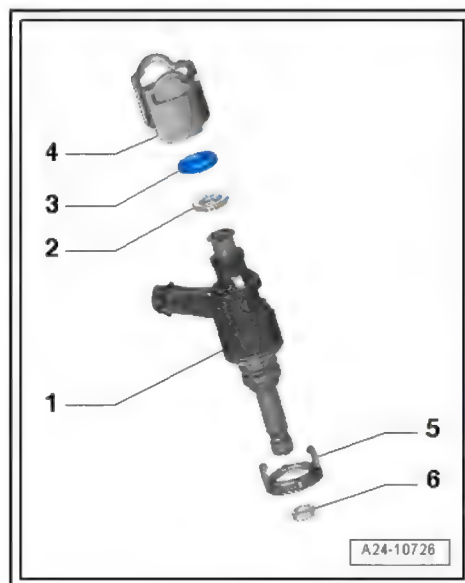
Dismantling injector

- Pull support ring -4-, O-ring -3- and spacer ring -2- off injector -1-.
- Unclip sealing element -5-.
- Carefully remove old combustion chamber ring seal -6-. To do so, cut open combustion chamber ring seal using knife or prise open with small screwdriver and then pull off forwards.



Note

Take care not to damage groove on injector. The injector must be renewed if the groove is damaged.

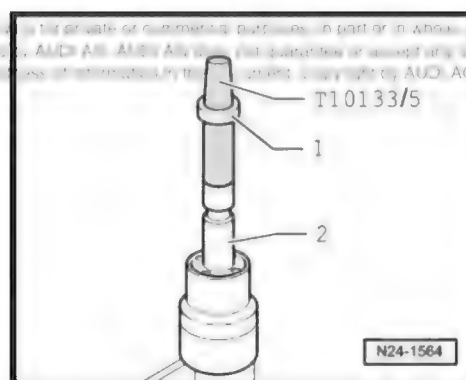
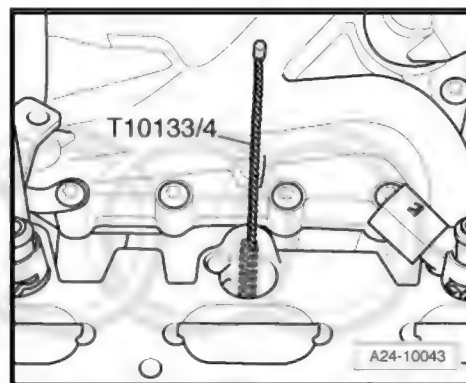


Installing

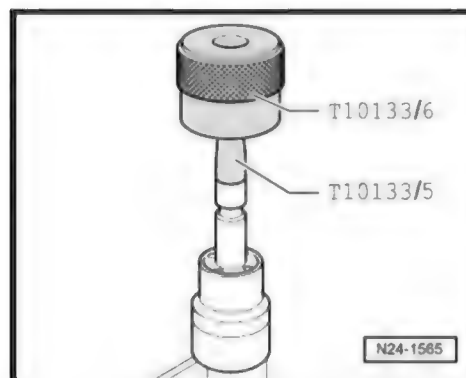


Note

- ◆ *Renew sealing element, combustion chamber ring seal and O-ring.*
- ◆ *Renew spacer ring if damaged.*
- ◆ *Lubricate O-rings of injectors lightly with clean engine oil.*
- Clean bore in cylinder head with nylon cylinder brush - T10133/4- .
- When re-installing an injector, clean any combustion residue off groove for combustion chamber ring seal and injector stem with a clean cloth.
- Fit assembly cone -T10133/5- with new combustion chamber ring seal -1- from repair kit onto injector -2-.



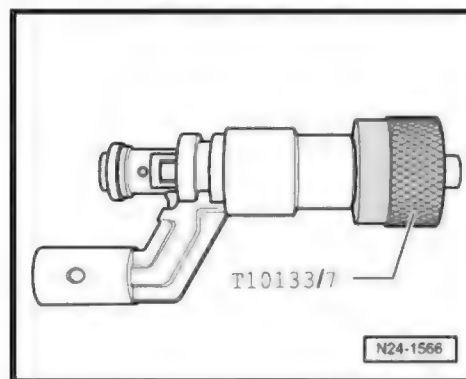
- Using assembly sleeve -T10133/6- , push combustion chamber ring seal onto assembly cone -T10133/5- as far as it will go.
- Turn round assembly sleeve -T10133/6- and slide combustion chamber ring seal into groove.



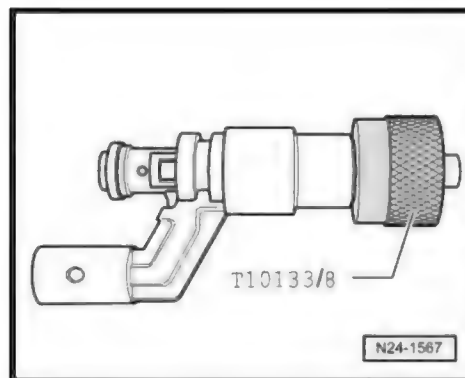
Note

The combustion chamber ring seal is widened when it is pushed onto the injector. After pushing it on, it therefore has to be compressed again. This is done in two stages, as described below.

- Push calibration sleeve -T10133/7- onto injector as far as it will go and simultaneously turn it slightly (approx. 180°).
- Pull calibration sleeve -T10133/7- off again by turning it in the opposite direction.



- Push calibration sleeve -T10133/8- onto injector as far as it will go and simultaneously turn it slightly (approx. 180°).
- Pull calibration sleeve -T10133/8- off again by turning it in the opposite direction.

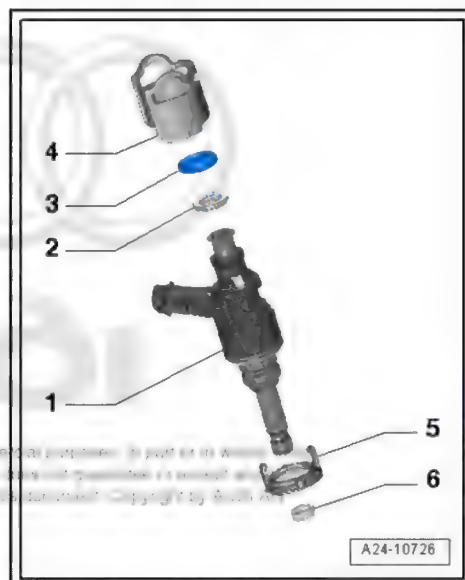


- Fit parts from repair kit onto injector -1-:
- 2 - Spacer ring
 - 3 - O-ring
 - 4 - Support ring
 - 5 - Sealing element
- To make it easier to install injector in fuel rail, lubricate new O-ring lightly with clean engine oil before installing it.


Note

The combustion chamber ring seal -6- must not be lubricated.

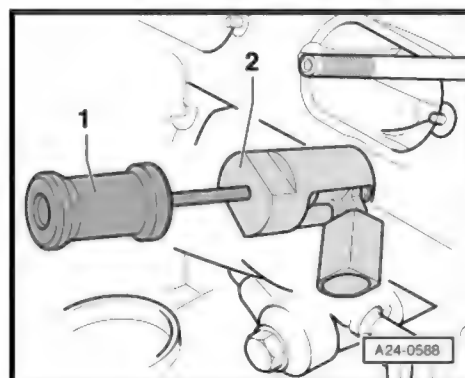
- Push injector by hand as far as it will go into aperture in cylinder head (do not use oil or grease). Ensure that the injector is properly seated in the cylinder head.


Note

- ♦ *It should be possible to insert injector easily. If necessary wait until the combustion chamber ring seal has contracted sufficiently.*
- ♦ *Note correct installation position and ensure that injectors are properly seated in cylinder head.*
- ♦ *If the injector cannot be pushed in by hand, use puller -T10133/2A- -2- with striker -T10133/3- to insert the injector.*
- Electrical connector of injector must engage in recess in cylinder head.

Perform further installation in reverse order, paying attention to the following:

- Install intake manifold (bottom section) ➔ [page 29](#) .
- Install supercharger ➔ Rep. gr. 21 .



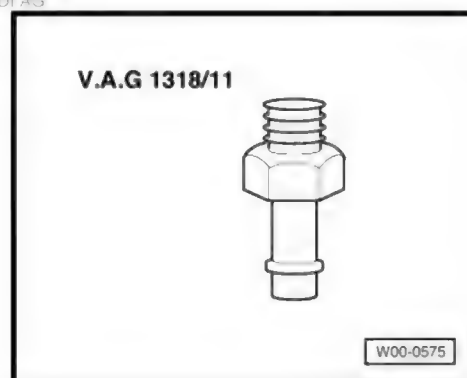
5.8 Checking fuel pressure and residual pressure (up to high-pressure pump)

Special tools and workshop equipment required

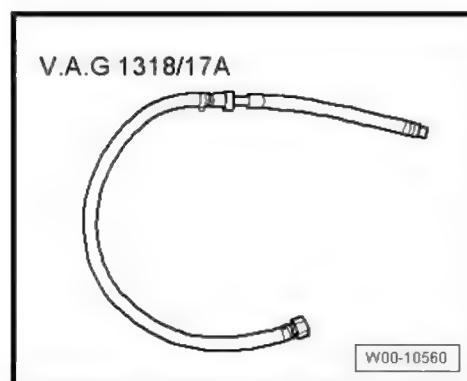
◆ K-Jetronic pressure tester -V.A.G 1318-



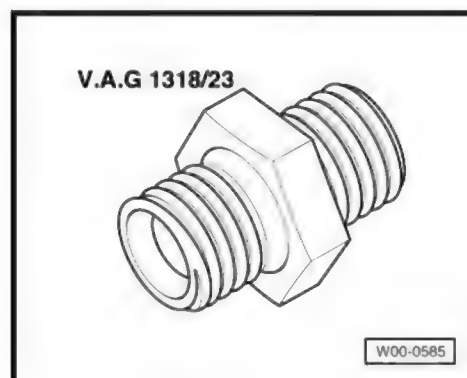
◆ Adapter -V.A.G 1318/11-



◆ Adapter set -V.A.G 1318/17A-



◆ Adapter -V.A.G 1318/23-



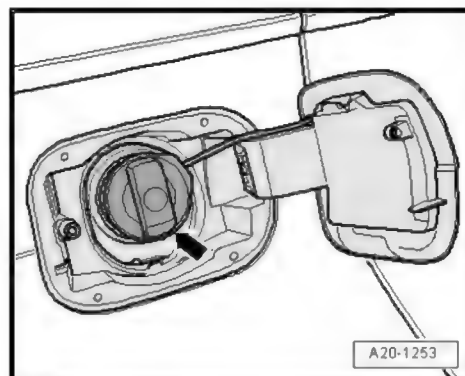
◆ ⇒ Vehicle diagnostic tester

◆ Fuel-resistant measuring container

Checking fuel pressure

- Battery voltage at least 12.5 V.
- Fuel filter OK.

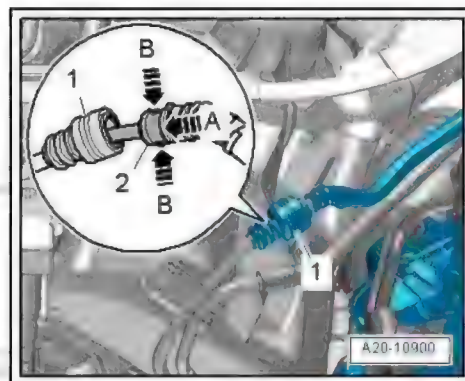
- Fuel tank at least $\frac{1}{4}$ full.
- Fuel pump control unit -J538- OK.
- Ignition off.
- Remove filler cap for fuel filler neck.



WARNING

Risk of injury caused by fuel.

- ◆ To reduce the pressure in the fuel system, wrap a clean cloth around the connection and carefully loosen the connection.



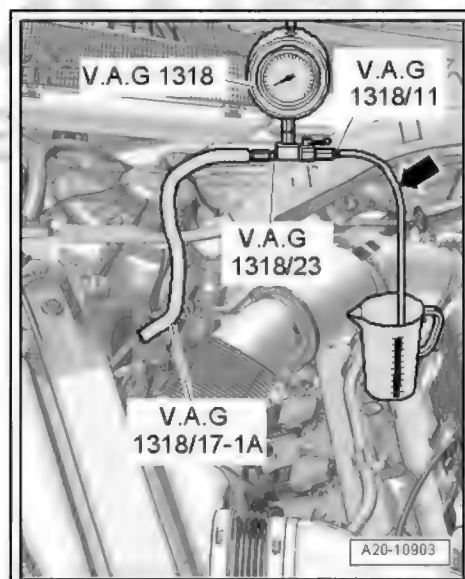
- Push down protective sleeve -1- and disconnect fuel line.
- First press hose connector -2- downwards -arrow A-, then press release tabs -arrows B-.
- Pull off hose connector, keeping release tabs depressed.
- Connect K-Jetronic pressure tester -V.A.G 1318- to fuel supply hose with adapters, as shown in illustration.
- Attach test hose -arrow- and hold end of hose in measuring container.



Note

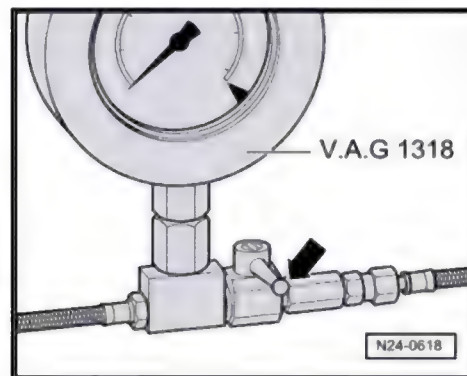
Fuel system must be bled before pressure can be checked.

- Connect ⇒ Vehicle diagnostic tester.
- Select „Engine electronics“ in vehicle self-diagnosis.
- Then select „Final control diagnosis“.
- Select „Fuel pump electronics“ from list and press „start“.



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- When fuel starts coming out of test hose, close cut-off valve on pressure tester.
- Lever is at right angle to direction of flow -arrow-.
- Read off fuel pressure on K-Jetronic pressure tester -V.A.G 1318-.
- Specification: 5 to 8 bar
- End this function when fuel pressure stops rising on K-Jetronic pressure tester -V.A.G 1318-.
- If specification is not attained, check delivery rate of fuel pump
 ⇒ Rep. gr. 20.



Checking residual pressure

- Check system for leaks and check residual pressure by watching drop in pressure on K-Jetronic pressure tester -V.A.G 1318-.
- After 10 minutes pressure should still be at least 3.0 bar.

If the residual pressure drops below 3.0 bar:

- ◆ Check union between pressure tester and fuel line for leaks.
- ◆ Check pressure tester for leaks.
- ◆ Check fuel lines and their connections for leaks.
- ◆ Renew fuel filter with integral fuel pressure regulator ⇒ Rep. gr. 20.
- ◆ Renew fuel pump ⇒ Rep. gr. 20.

Assembling

Installation is carried out in the reverse order; note the following:



Note

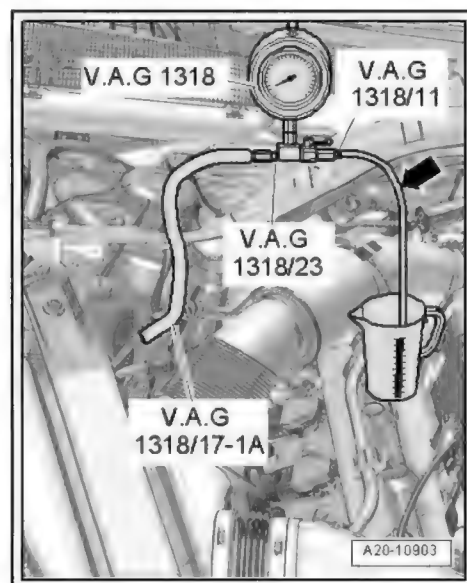
Before removing the pressure tester, release the fuel pressure by opening the cut-off valve. To do so, hold end of test hose -arrow- into measuring container.

- Re-attach fuel supply line (make sure that all parts are clean and that there are no leaks).



Note

Check fuel system for leaks.



6 High-pressure pump

Overview

- ◆ ⇒ „6.1 High-pressure pump - exploded view“, page 38
- ◆ ⇒ „6.2 Removing and installing high-pressure pipe“, page 39
- ◆ ⇒ „6.3 Removing and installing high-pressure pump“, page 41

6.1 High-pressure pump - exploded view

1 - Fuel pressure sender for low pressure -G410-

- 15 Nm

2 - Not fitted

3 - Bolt

- Tightening torque and sequence ⇒ page 39

4 - High-pressure pump

- With fuel metering valve -N290-
- Removing and installing ⇒ page 41
- Do not dismantle

5 - Threaded connection

- Connections must not be damaged
- 27 Nm

6 - Fuel supply hose

- Low-pressure section

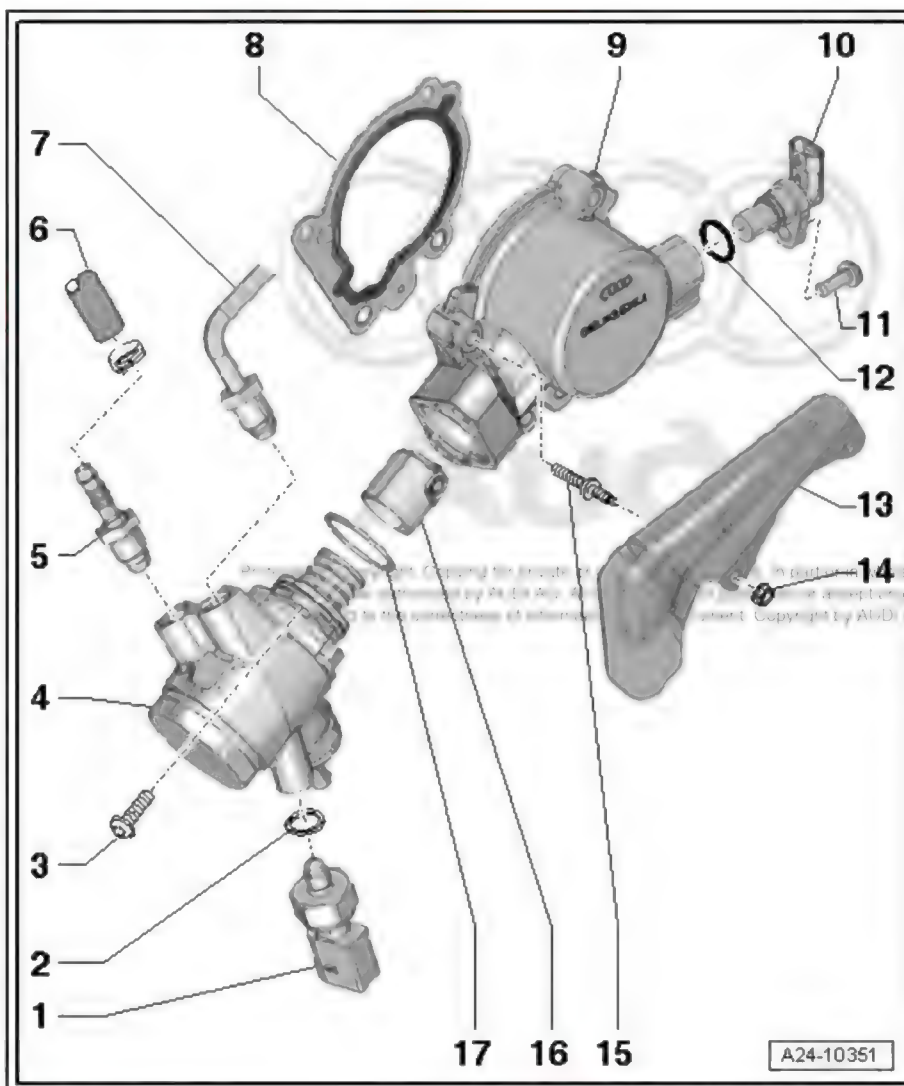
7 - High-pressure pipe



WARNING

Risk of injury - fuel system operates under high pressure.

The fuel pressure in the high-pressure section of the injection system must be reduced to a residual pressure prior to opening the system.



- Reducing fuel pressure in high-pressure section of injection system ⇒ page 4
- Removing and installing ⇒ page 39
- Do not alter shape
- Check for damage before re-installing
- Lubricate thread of union nut with fuel
- 25 Nm

8 - Gasket

- Renew

9 - Housing

10 - Hall sender -G40-

- ☐ Removing and installing ⇒ [page 59](#)

11 - Bolt

- ☐ 9 Nm

12 - O-ring

- ☐ Renew

13 - Protective plate

- ☐ For high-pressure pipe

14 - Nut

- ☐ 9 Nm

15 - Threaded pin

- ☐ 9 Nm

16 - Roller tappet

- ☐ Can only be installed in one position
- ☐ Lubricate lightly with clean engine oil before installing

17 - O-ring

- ☐ Renew
- ☐ Lubricate lightly with clean engine oil before installing

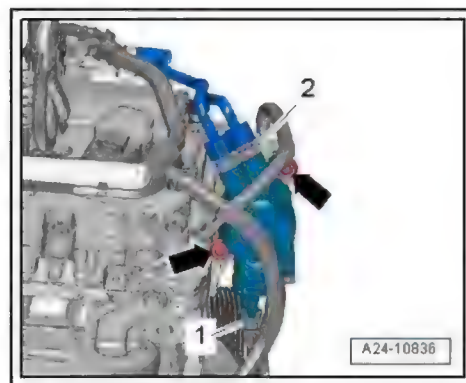


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High-pressure pump - tightening torque and sequence

– Tighten bolts in 2 stages as follows:

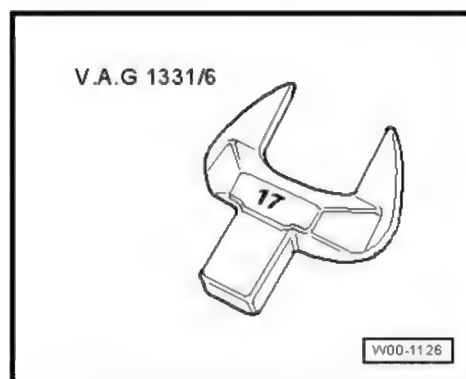
Stage	Bolts	Tightening torque
1.	-arrows-	Screw in bolts by hand until they make contact
2.	-arrows-	Tighten in stages; final torque 20 Nm



6.2 Removing and installing high-pressure pipe

Special tools and workshop equipment required

- ◆ Open end spanner insert, AF 17 -V.A.G 1331/6-



Removing

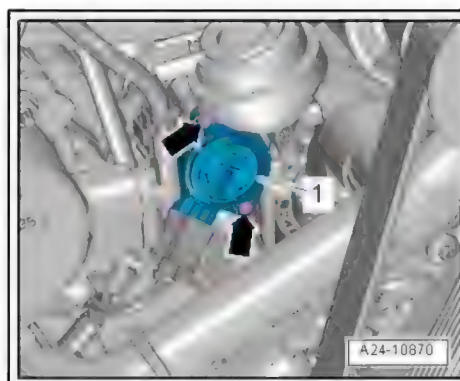


WARNING

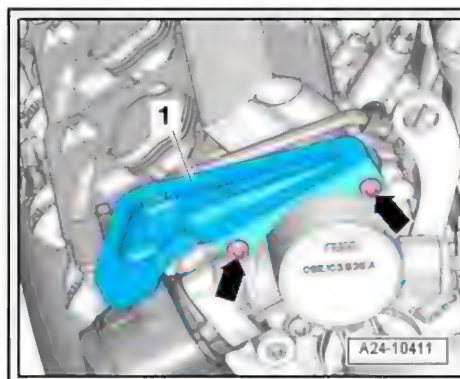
The fuel system operates at extremely high pressure. This can cause injury.

- ◆ *The fuel pressure in the high-pressure section of the injection system must be reduced to a residual pressure prior to opening the system.*

- Reduce fuel pressure in high-pressure section of injection system ➔ [page 4](#) .
- Remove supercharger ➔ Rep. gr. 21 .
- Remove bolts -arrows- and move intake manifold flap potentiometer -G336- (right-side) -item 1- with vacuum unit for intake manifold flap clear to one side.



- Unscrew nuts -arrows- and remove guard plate -1-.



- Unscrew bolts -arrows- and bolt connection -1-.
- Unscrew union nuts -2- and -3- (counterhold threaded connection).



Note

Do not attempt to bend high-pressure pipe to a different shape.

Installing

Tightening torques

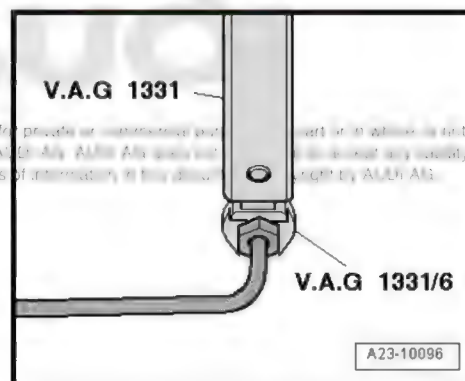
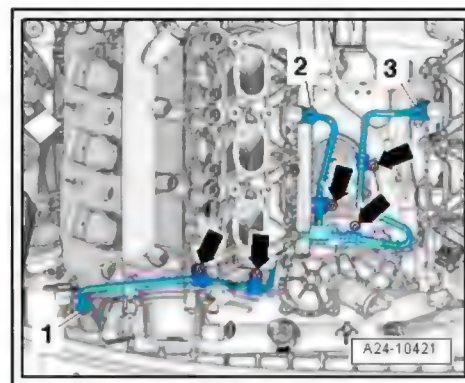
- ➔ „5.1 Intake manifold (bottom section), fuel rail, injector - exploded view“, page 23 .
- ➔ „6.1 High-pressure pump - exploded view“, page 38 .



Note

- ◆ *The connections of the high-pressure pipe must not be damaged.*
- ◆ *Do not attempt to bend high-pressure pipe to a different shape.*

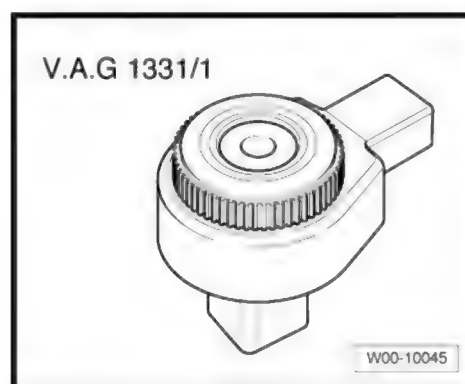
- First tighten union nut by hand until it makes contact, making sure that high-pressure pipe is not under tension.
- Tighten union nut with torque wrench -V.A.G 1331- and tool insert, AF 17 -V.A.G 1331/6- ; to do so, counterhold at hexagon flats of threaded connection on fuel rail with an open-end spanner.
- Do not tighten bolt for retainer until high-pressure pipe has been tightened.
- Install supercharger ➔ Rep. gr. 21 .



6.3 Removing and installing high-pressure pump

Special tools and workshop equipment required

- ◆ Ratchet -V.A.G 1331/-



- ◆ Socket insert AF 14, flared ring spanner -V.A.G 1331/8-



Removing



WARNING

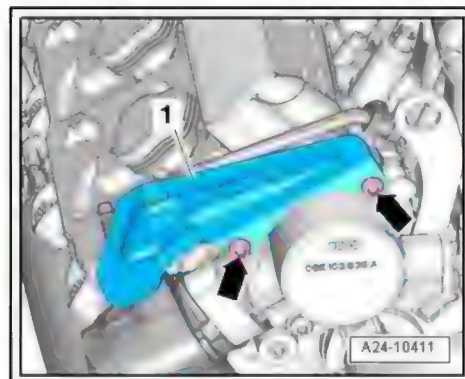
The fuel system operates at extremely high pressure. This can cause injury.

- ◆ *The fuel pressure in the high-pressure section of the injection system must be reduced to a residual pressure prior to opening the system.*



Note

- ◆ *The high-pressure pump should only be removed and installed when the engine is cold.*
- ◆ *When installing the high-pressure fuel pump, it is essential to ensure that no dirt enters the fuel system.*
- ◆ *Use a cloth to catch escaping fuel.*
- Reduce fuel pressure in high-pressure section of injection system ⇒ [page 4](#) .
- Remove air cleaner housing ⇒ [page 20](#) .
- Unscrew nuts -arrows- and remove guard plate -1-.



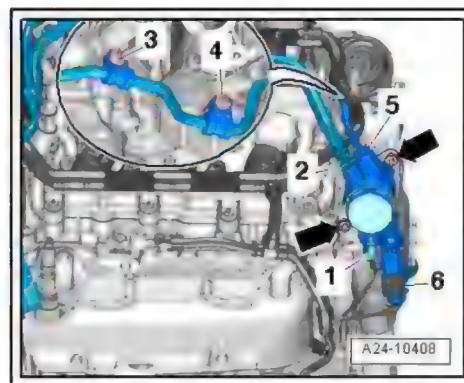
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- Unplug electrical connectors -1- and -6-.
- Remove bolt -3- on retaining clip.
- Unscrew connections -2- and -5-.
- Remove bolts -arrows-.
- Carefully pull out high-pressure pump. It is possible that the roller tappet may remain lodged inside.



Note

- ◆ *Do not attempt to bend high-pressure pipe to a different shape.*
- ◆ *Disregard -item 4-.*



Installing

Installation is carried out in the reverse order; note the following:

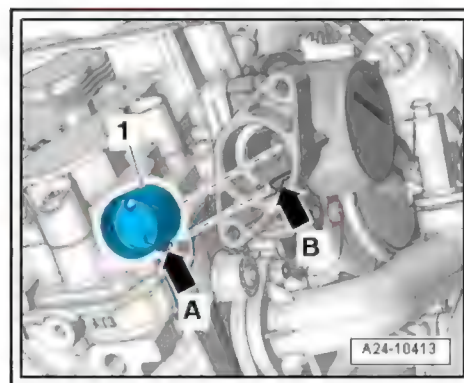
- Tightening torques
 ⇒ [„6.1 High-pressure pump - exploded view“, page 38](#)



Note

- ◆ *Fit new O-ring.*
- ◆ *The connections of the high-pressure pipe must not be damaged.*
- ◆ *Do not attempt to bend high-pressure pipe to a different shape.*

- Check roller tappet -1- for damage and renew if necessary.
- Lightly lubricate roller tappet with oil and insert it so that lug -arrow A- slides into guide notch -arrow B-.
- Rotate crankshaft in direction of engine rotation by turning bolt for vibration damper, and at the same time press roller tappet into cylinder head until it reaches its lowest point.
- Only lift high-pressure pipe slightly to fit high-pressure pump.
- Press high-pressure pump down by hand as far as possible onto stop.
- At the same time, tighten securing bolts by hand.
- Then tighten securing bolts alternately to 5 Nm (do not tilt high-pressure pump).
- Now tighten securing bolts alternately to final torque.
- Tightening torque for securing bolts
 ⇒ [Fig. „High-pressure pump - tightening torque and sequence“, page 39](#)
- Install high-pressure pipe
 ⇒ [„6.2 Removing and installing high-pressure pipe“, page 39](#).
- Install air cleaner housing
 ⇒ [„4.4 Removing and installing air cleaner housing“, page 20](#).
- Check fuel system for leaks
 ⇒ [„1.8 Checking for leaks in the fuel system“, page 5](#).



7 Lambda probes

Overview

- ◆ ⇒ „7.1 Lambda probes - overview“, page 44
- ◆ ⇒ „7.2 Removing and installing Lambda probe G39 and Lambda probe after catalytic converter G130“, page 45
- ◆ ⇒ „7.3 Removing and installing Lambda probe 2 G108 and Lambda probe 2 after catalytic converter G131“, page 46

7.1 Lambda probes - overview



Note

- ◆ New Lambda probes are coated with an assembly paste.
- ◆ In the case of a used Lambda probe, coat only the thread with high-temperature paste; refer to ⇒ Electronic parts catalogue for high-temperature paste.
- ◆ The assembly paste / high-temperature paste must not make contact with the slots on the Lambda probe body.

1 - Lambda probe 2 after catalytic converter -G131-

- ☐ With Lambda probe 2 heater after catalytic converter -Z30-

Removing and installing ⇒ page 46

- ☐ 55 Nm

2 - Lambda probe 2 -G108-

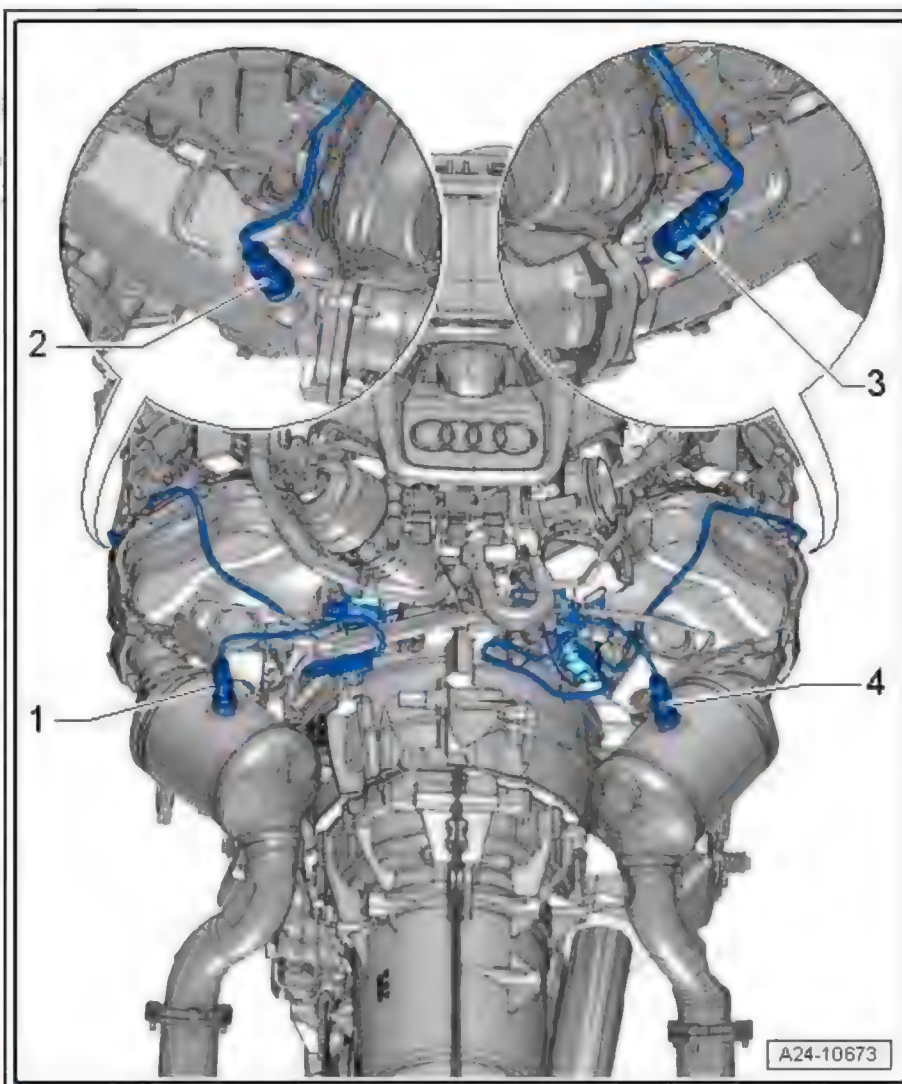
- ☐ With Lambda probe heater 2 -Z28-
- ☐ Removing and installing
⇒ page 46
- ☐ 55 Nm

3 - Lambda probe -G39-

- ☐ With Lambda probe heater -Z19-
- ☐ Removing and installing
⇒ page 45
- ☐ 55 Nm

4 - Lambda probe after catalytic converter -G130-

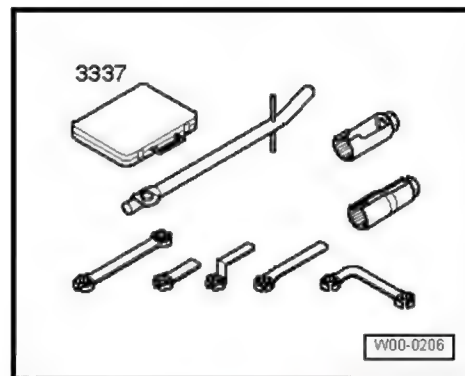
- ☐ With Lambda probe 1 heater after catalytic converter -Z29-
- ☐ Removing and installing
⇒ page 45
- ☐ 55 Nm



7.2 Removing and installing Lambda probe -G39- and Lambda probe after catalytic converter -G130-

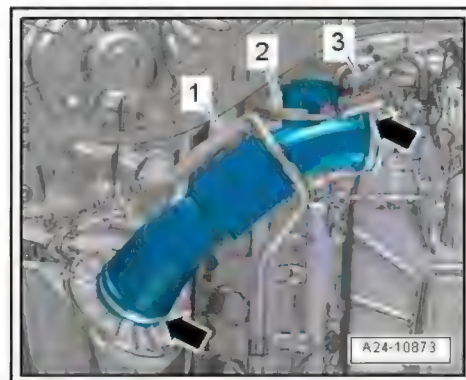
Special tools and workshop equipment required

- ◆ Lambda probe open ring spanner set -3337-

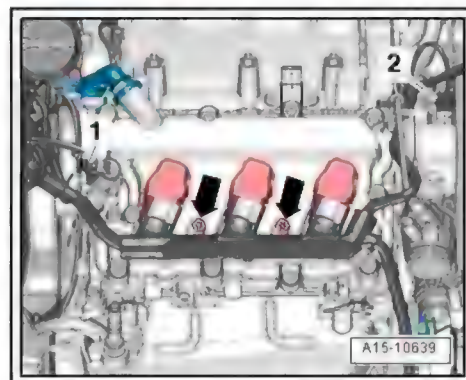


Removing

- Move fuel hose -1- and hose -2- from activated charcoal filter clear at air pipe.
- Detach vacuum hose -3- from connection on air pipe.
- Release hose clips -arrows- and remove air pipe.



- Remove bolts -arrows- and unplug electrical connectors at ignition coils.
- Press electrical wiring harness up slightly.

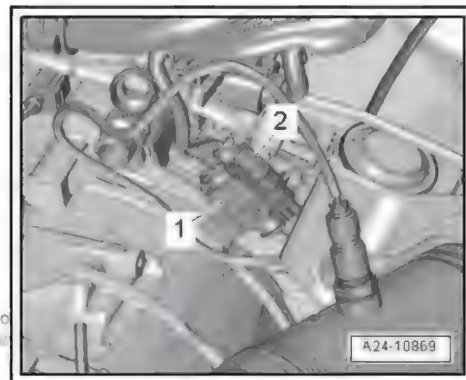


Note

Disregard -items 1, 2-.

- Unplug relevant electrical connector and move electrical wiring clear:

- 1 - For Lambda probe after catalytic converter -G130-
- 2 - For Lambda probe -G39-

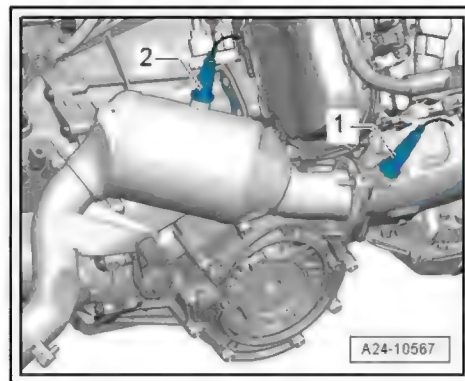


- Unscrew relevant Lambda probes:
- 1 - Lambda probe -G39- using ring spanner -3337/7-
- 2 - Lambda probe after catalytic converter -G130- using ring spanner -3337/2-



Note

For illustration purposes, the installation position is shown with the engine removed.



Installing

- Tightening torques
⇒ [7.1 Lambda probes - overview](#), page 44

Installation is carried out in the reverse order; note the following:



Note

- ◆ New Lambda probes are coated with an assembly paste.
- ◆ If reinstalling the old Lambda probes, coat the threads with high-temperature paste ⇒ *Electronic parts catalogue*.
- ◆ The assembly paste/high-temperature paste must not get into the slots on the Lambda probe body.
- ◆ When installing, the Lambda probe wire must always be reattached at the same locations to prevent it from coming into contact with the exhaust pipe.
- ◆ Fit all cable ties in the original positions when installing.

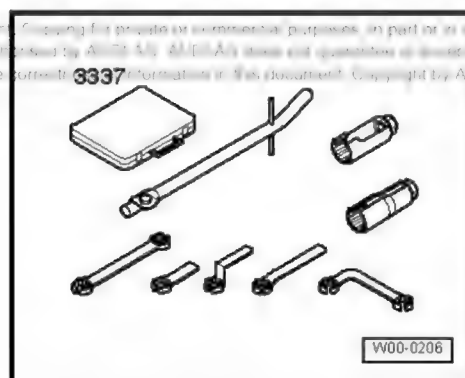
- Install throttle valve module -J338- ⇒ [page 26](#).

7.3 Removing and installing Lambda probe 2 -G108- and Lambda probe 2 after catalytic converter -G131-

Special tools and workshop equipment required

- ◆ Lambda probe open ring spanner set -3337-

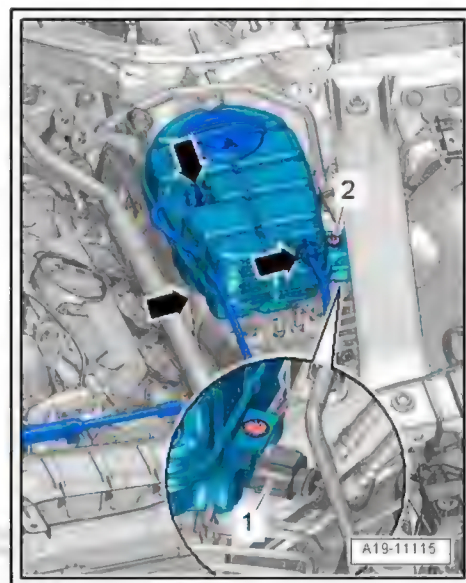
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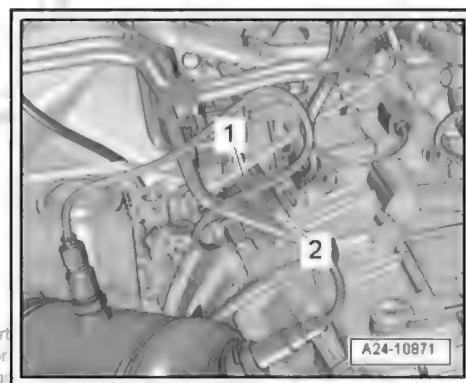
Removing

- Remove engine cover panel (rear) ⇒ [page 19](#).
- Remove bolt -2-.

- Unplug electrical connector -1-.
- Move coolant expansion tank to side (coolant hoses -arrows- remain connected).



- Unplug relevant electrical connector and move electrical wiring clear:
- 1 - For Lambda probe 2 -G108-
 - 2 - For Lambda probe 2 -G131- (after catalytic converter)



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– Unscrew relevant Lambda probe using ring spanner -3337/7- :

1 - Lambda probe 2 -G108-

2 - Lambda probe 2 after catalytic converter -G131-



Note

For illustration purposes, the installation position is shown with the engine removed.

Installing

• Tightening torques

⇒ „7.1 Lambda probes - overview“, page 44

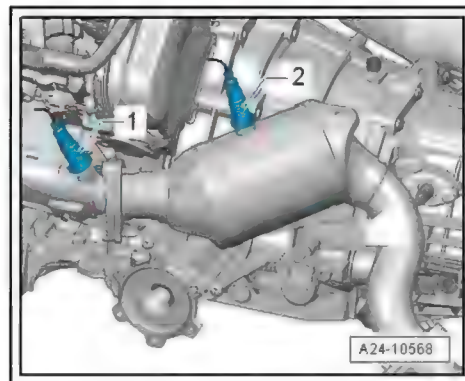
Installation is carried out in the reverse order; note the following:



Note

- ◆ *New Lambda probes are coated with an assembly paste.*
- ◆ *If reinstalling the old Lambda probes, coat the threads with high-temperature paste ⇒ Electronic parts catalogue .*
- ◆ *The assembly paste/high-temperature paste must not get into the slots on the Lambda probe body.*
- ◆ *When installing, the Lambda probe wire must always be reattached at the same locations to prevent it from coming into contact with the exhaust pipe.*
- ◆ *Fit all cable ties in the original positions when installing.*

– Install plenum chamber partition panel ⇒ Rep. gr. 50 .



8 Engine control unit

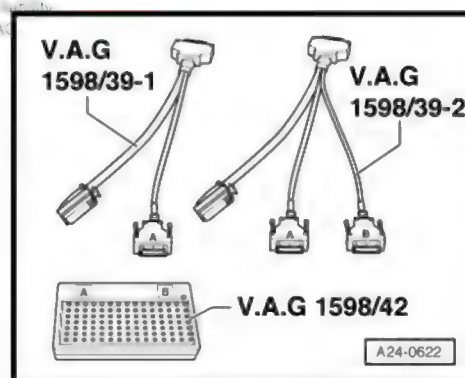
Overview

- ◆ ⇒ „8.1 Wiring and component check with test box V.A.G 1598/42“, page 49
- ◆ ⇒ „8.2 Removing and installing engine control unit J623“, page 51

8.1 Wiring and component check with test box -V.A.G 1598/42-

Special tools and workshop equipment required

- ◆ Adapter cable -V.A.G 1598/39-

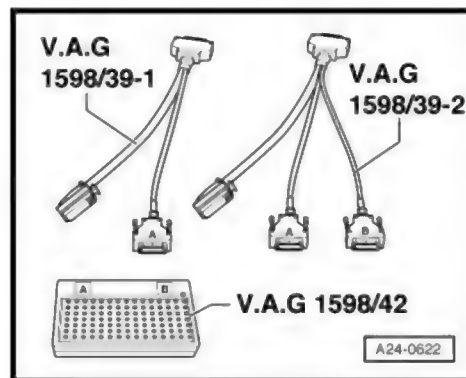


- ◆ Test box -V.A.G 1598/42-
- ◆ ⇒ Vehicle diagnostic tester



Note

- ◆ The test box -V.A.G 1598/42- has 105 sockets. It can be connected to the engine control unit via 2 different adapter cables.
- ◆ The engine control unit is connected to the vehicle's wiring harness via two connectors, one of which has 60 pins, the other has 94 pins.
- ◆ To carry out tests on the 60-pin wiring harness connector, the adapter cable -V.A.G 1598/39-1- is connected to connector -A- on the test box. For components connected to 60-pin wiring harness connector ➔ Current flow diagrams, Electrical fault finding and Fitting locations.
- ◆ To carry out tests on the 94-pin wiring harness connector, the adapter cable -V.A.G 1598/39-2- must be connected to connectors -A- and -B- on the test box. For components connected to 94-pin wiring harness connector ➔ Current flow diagrams, Electrical fault finding and Fitting locations.
- ◆ The test box -V.A.G 1598/42- is designed so it can be connected both to the wiring harness for the engine control unit and to the engine control unit itself at the same time. The advantage of this is that the electronic engine control system remains fully functional when the test box is connected (for example, for measuring signals when the engine is running).
- ◆ Always use auxiliary measuring set -V.A.G 1527B- to connect test equipment (e.g. voltage tester -V.A.G 1526E- , hand-held multimeter -V.A.G 1594C- etc.).



The engine control unit has to be removed before connectors can be unplugged from engine control unit ➔ [page 51](#) .



Caution

Electronic components are susceptible to damage.

- ◆ Select the appropriate measuring range before connecting the test leads and observe test requirements.

- Remove engine control unit ➔ [page 51](#) .
- Connect test box -V.A.G 1598/42- to wiring harness connector. The earth clip on the test box must be connected to the negative battery terminal. The instructions for performing the individual tests indicate whether or not the engine control unit itself also needs to be connected to the test box.
- Carry out test as described in appropriate repair procedures.

Installing engine control unit

Installation is performed in the reverse sequence.

The procedure required after connecting the new engine control unit is described in the Guided Fault Finding or Guided Functions.



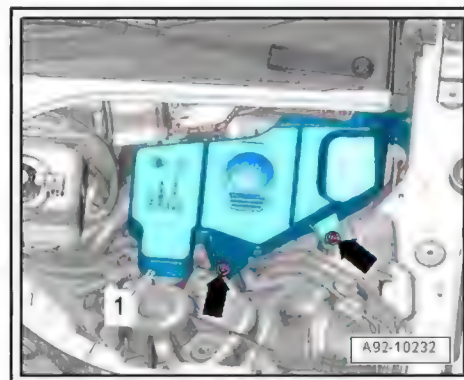
Note

After completion of the Guided Fault Finding routine, the tester will attempt to erase the event memories of all control units. If this is not successful, the remaining faults registered in the memories must be rectified until all fault entries can be erased.

8.2 Removing and installing engine control unit -J623-

Removing

- When renewing engine control unit, select diagnosis object „Replace engine control unit“ in „Guided Functions“ mode of ⇒ Vehicle diagnostic tester.
- Switch off ignition.
- Remove plenum chamber cover ⇒ Rep. gr. 50 .
- Unscrew bolts -arrows- and pull filler neck out of washer fluid reservoir and through opening in body to right side.



- Release catch -arrow- and detach engine control unit -J623- -item 1-.



Note

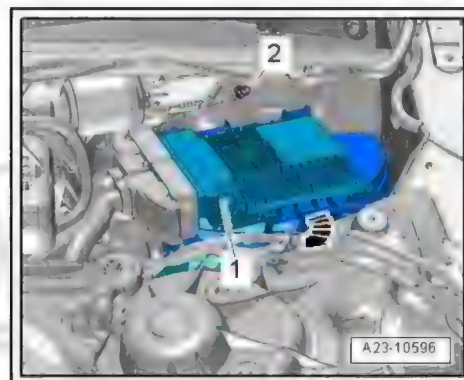
Disregard -item 2-.

Installing

Installation is carried out in the reverse order; note the following:

After installing a new engine control unit, the following operation must be performed:

- Activate engine control unit using ⇒ Vehicle diagnostic tester in „Guided Functions“ mode, „Replace engine control unit“.



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28 – Ignition system

1 General notes and safety precautions

Overview

- ◆ ⇒ „1.1 General notes on ignition system“, page 52
- ◆ ⇒ „1.2 Safety precautions when working on the injection and ignition system“, page 52
- ◆ ⇒ „1.3 Safety precautions when working on vehicles with start/stop system“, page 53
- ◆ ⇒ „1.4 Safety precautions when using testers and measuring instruments during a road test“, page 53

1.1 General notes on ignition system

- ◆ The engine control unit has a self-diagnosis capability.
- ◆ A voltage of at least 11.5 V is required for proper operation of the electrical components.
- ◆ Certain tests may lead to entries being stored in the event memory of the engine control unit. The event memory must be interrogated after completing all tests and repair work.
- ◆ If the engine starts, runs for a short period and then cuts out after completing fault finding, repairs or component tests, this may be due to the immobilizer disabling the engine control unit. The event memory of the engine control unit must then be interrogated and, if necessary, the control unit must be adapted.

1.2 Safety precautions when working on the injection and ignition system

To prevent injuries to persons and/or damage to the fuel injection and ignition system, note the following:

- ◆ Persons wearing a cardiac pacemaker must at all times maintain a safe distance from high-voltage components such as the ignition system and xenon headlights.
- ◆ Do not touch or disconnect ignition wiring when the engine is running or being turned at starter speed.
- ◆ Always switch off the ignition before connecting or disconnecting electrical wiring for the injection or ignition system or tester cables.
- ◆ Always switch off ignition before washing engine.
- ◆ If you want to crank the engine at starting speed without actually starting the engine (e.g. compression test), first unplug the electrical connectors from the ignition coils ⇒ page 55 .
- ◆ Also remove fuse for fuel pump control unit -J538- ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.
- ◆ Entries will be stored in the event memory of the engine control unit if electrical connectors have been unplugged and the engine started.



Caution

To prevent irreparable damage to the electronic components when disconnecting the battery:

- ◆ *Observe notes on procedure for disconnecting the battery.*
- ◆ *Always switch off the ignition before disconnecting the battery.*

– Disconnect battery ⇒ Electrical system; Rep. gr. 27 .

1.3 Safety precautions when working on vehicles with start/stop system



WARNING

Risk of injury due to automatic engine start on vehicles with start/stop system.

- ◆ *On vehicles with activated start/stop system (this is indicated by a message in the instrument cluster display), the engine may start automatically on demand.*
- ◆ *Therefore it is important to ensure that the start/stop system is deactivated when performing repairs (switch off ignition, if required switch on ignition again).*

1.4 Safety precautions when using testers and measuring instruments during a road test

Note the following if testers and measuring instruments have to be used during a road test:



WARNING

Accidents can be caused if the driver is distracted by test equipment while road-testing, or if test equipment is not properly secured.

Persons sitting in the front passenger's seat could be injured if the airbag is triggered in an accident.

- *The use of test equipment while driving causes distraction.*
- *There is an increased risk of injury if test equipment is not secured.*
- ◆ *Test equipment must always be secured on the rear seat with a strap and operated from the rear seat by a second person.*



2 Servicing ignition system

Overview

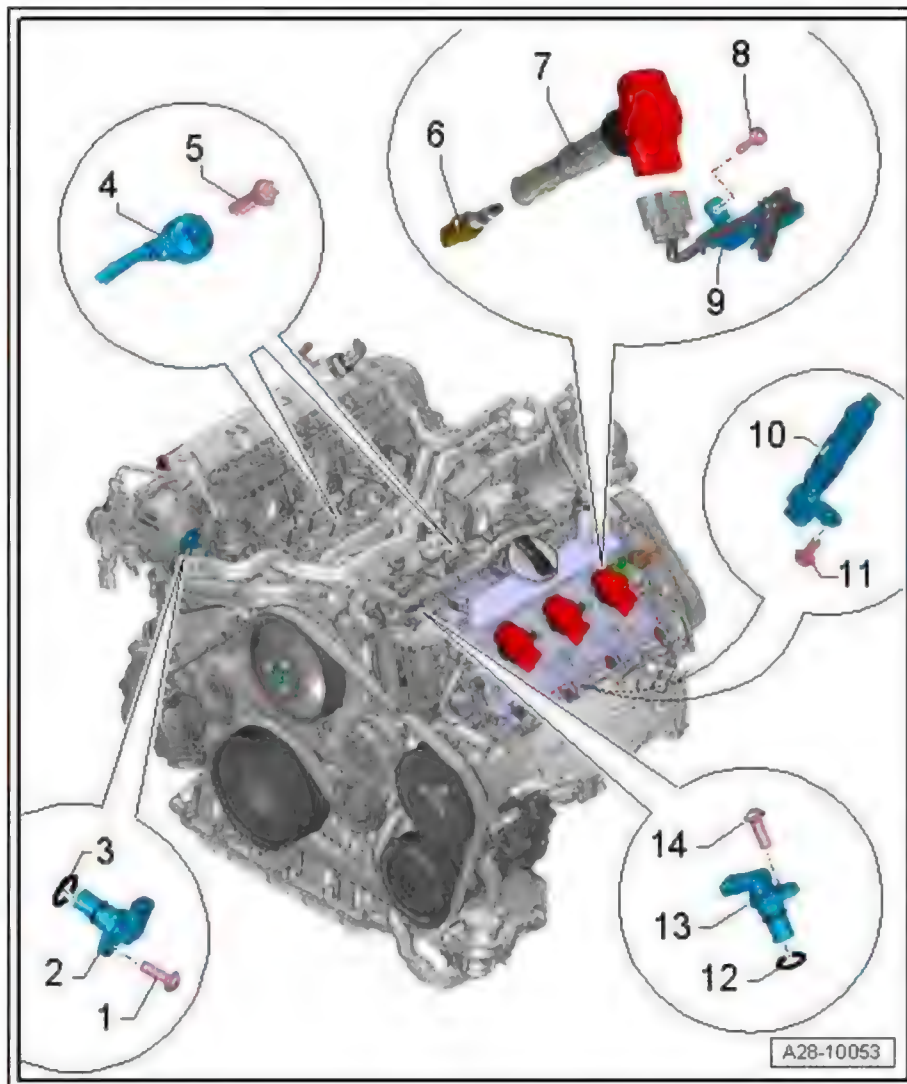
- ◆ ⇒ „2.1 Test data“, page 54
- ◆ ⇒ „2.2 Ignition system - exploded view“, page 55
- ◆ ⇒ „2.3 Removing and installing ignition coils“, page 55
- ◆ ⇒ „2.4 Removing and installing knock sensors G61 / G66 “, page 58
- ◆ ⇒ „2.5 Removing and installing Hall senders G40 / G163 “, page 59
- ◆ ⇒ „2.6 Removing and installing engine speed sender G28 “, page 59

2.1 Test data

3.0 ltr. TFSI engine		
Idling speed		Cannot be adjusted; regulated by idling speed stabilisation
Ignition timing		Not adjustable (determined by control unit)
Ignition system		Multi-coil system with 6 ignition coils (output stages integrated) connected directly to spark plugs via spark plug connectors
Spark plugs	Designations	⇒ Data sheets for exhaust emissions test
	Tightening torque	⇒ Maintenance ; Booklet 411
Firing order		1-4-3-6-2-5

2.2 Ignition system - exploded view

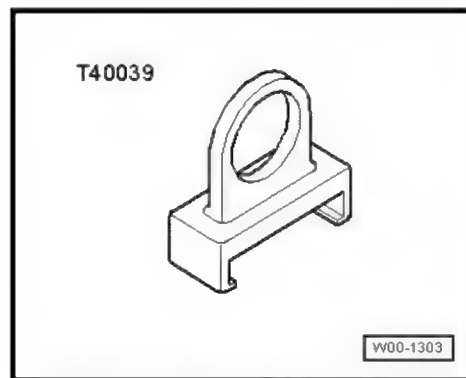
- 1 - Bolt
☐ 9 Nm
- 2 - Hall sender -G40-
☐ Removing and installing
 ⇒ [page 59](#)
- 3 - O-ring
☐ Renew
- 4 - Knock sensor
☐ Cylinder bank 1 (right-side): knock sensor 1 - G61-
☐ Cylinder bank 2 (left-side): knock sensor 2 - G66-
☐ Removing and installing
 ⇒ [page 58](#)
- 5 - Bolt
☐ 25 Nm
- 6 - Spark plug
☐ Change interval ⇒ Maintenance tables
☐ Tightening torque ⇒ Maintenance ; Booklet 411
- 7 - Ignition coil
☐ Removing and installing
 ⇒ [page 55](#)
- 8 - Bolt
☐ 5 Nm
- 9 - Electrical wiring harness
- 10 - Bolt
☐ 9 Nm
- 11 - Engine speed sender -G28-
☐ Removing and installing ⇒ [page 59](#)
- 12 - O-ring
☐ Renew
- 13 - Hall sender 2 -G163-
☐ Removing and installing ⇒ [page 59](#)
- 14 - Bolt
☐ 9 Nm



2.3 Removing and installing ignition coils

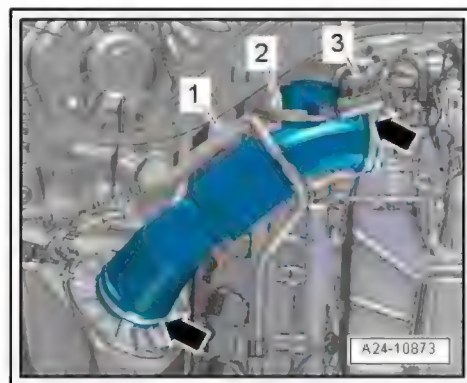
Special tools and workshop equipment required

◆ Puller -T40039-



Removing ignition coils on cylinder bank 1:

- Move fuel line -1- and line -2- leading to activated charcoal filter clear on air cleaner housing and air pipe.
- Detach vacuum hose -3- from connection on air pipe.
- Release hose clips -arrows- and remove air pipe.

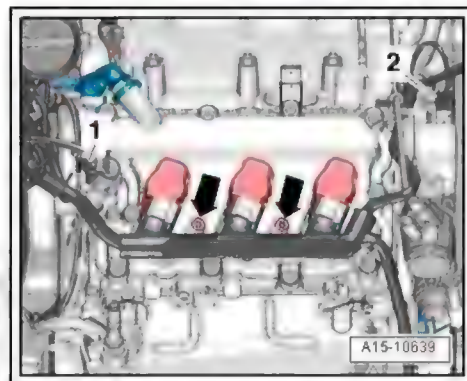


- Remove bolts -arrows- and unplug electrical connectors at ignition coils.
- Move electrical wiring harness down slightly.



Note

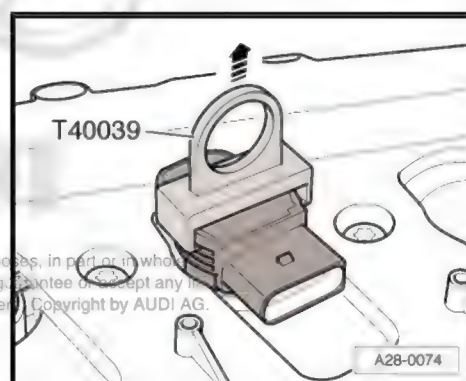
Disregard -items 1, 2-.



- Pull ignition coils out of spark plug holes using puller -T40039-.

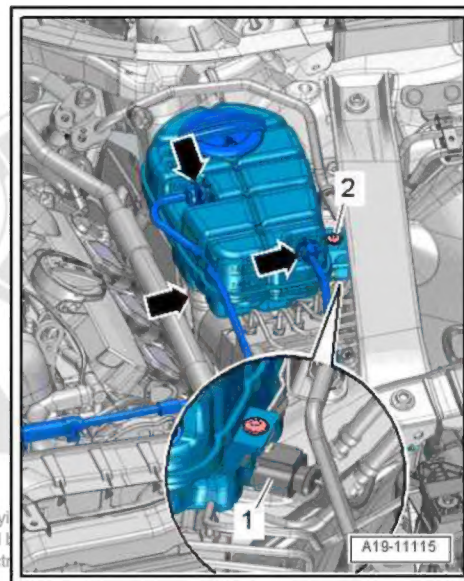
Removing ignition coils on cylinder bank 2:

- Remove bolt -2-.



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- Unplug electrical connector -1-.
- Move coolant expansion tank to side (coolant hoses -arrows- remain connected).



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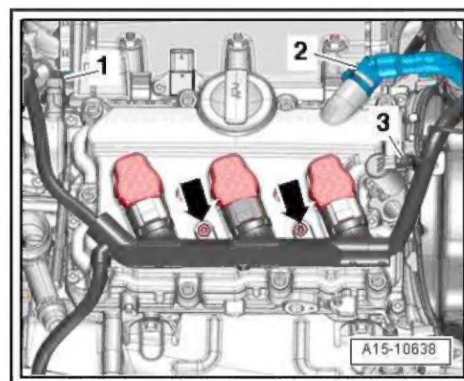
not
 ility

- Remove bolts -arrows- and unplug electrical connectors at ignition coils.
- Move electrical wiring harness down slightly.



Note

Disregard -items 1, 2, 3-.



Continuation for both sides:

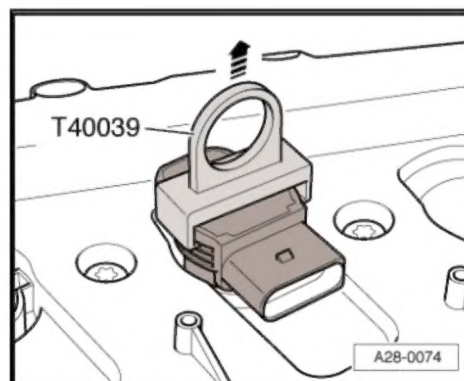
- Remove ignition coils using puller -T40039- -arrow-.

Installing

- Fit all ignition coils loosely into spark plug holes.
- Align the ignition coils with the connectors and attach all connectors onto ignition coils simultaneously.
- Press ignition coils onto spark plugs by hand evenly (do NOT use tool).

The remaining installation steps are carried out in the reverse sequence.

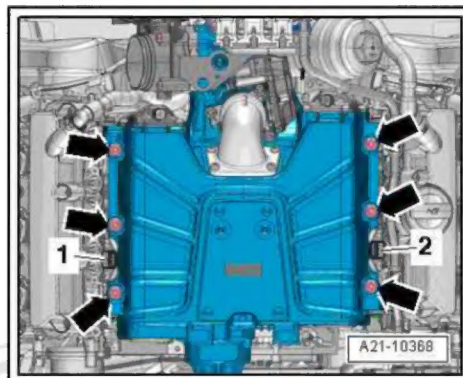
- Tightening torque for electrical wiring guide for ignition coils to cylinder head cover: 5 Nm



2.4 Removing and installing knock sensors -G61- / -G66-

Removing

- Remove supercharger ⇒ Rep. gr. 21 .
- Remove corresponding intake manifold (bottom section)
⇒ [page 29](#) .

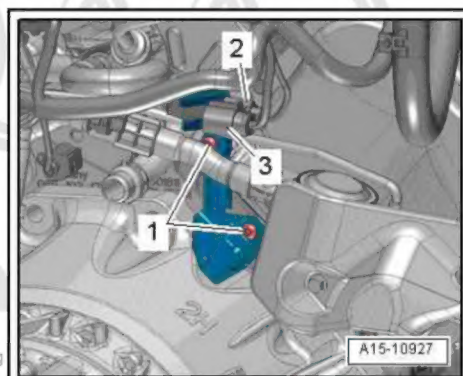


- Take electrical connector -3- (cylinder bank 1) out of bracket.
- Remove electrical connector -2- for knock sensor 1 -G61- from bracket and unplug connector.



Note

Disregard -item 1-.



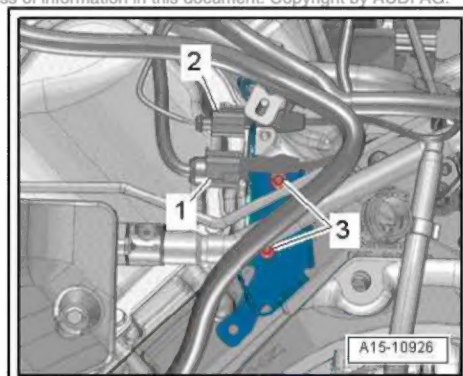
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- Take electrical connector -2- (cylinder bank 2) for knock sensor 2 -G66- out of bracket and unplug connector.



Note

Disregard -items 1, 3-.



- Remove bolt -1- for knock sensor 1 -G61- or bolt -2- for knock sensor 2 -G66- and detach knock sensor.

Installing

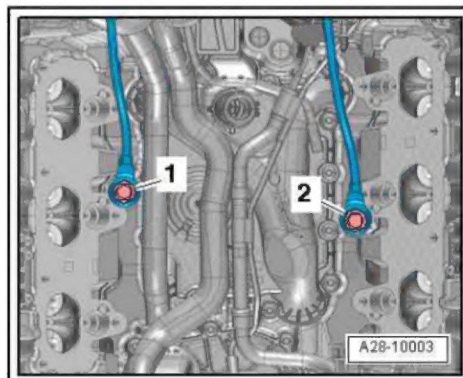
- Re-install whichever knock sensor was removed.



Note

The tightening torque influences the function of the knock sensor.

- Tightening torques
⇒ [„2.2 Ignition system - exploded view“, page 55](#)
- Install intake manifold bottom section (left and right)
⇒ [page 29](#) .
- Install supercharger ⇒ Rep. gr. 21 .

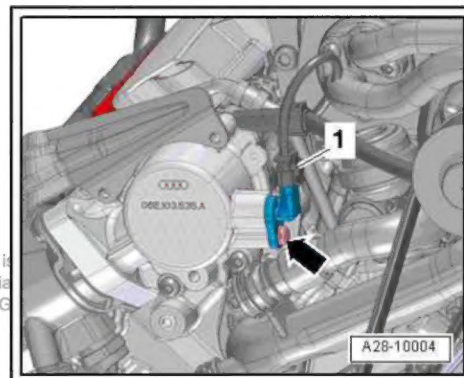


2.5 Removing and installing Hall senders - G40- / -G163-

Removing

- Remove engine cover panel (front) ➔ [page 19](#) .
- Unplug electrical connector -1- (cylinder bank 1).
- Unscrew bolt -arrow- and remove Hall sender -G40- .

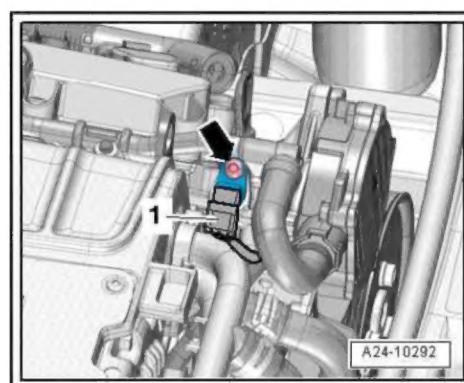
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- Unplug electrical connector -1- (cylinder bank 2).
- Remove bolt -arrow- and detach Hall sender 2 -G163- .

Installing

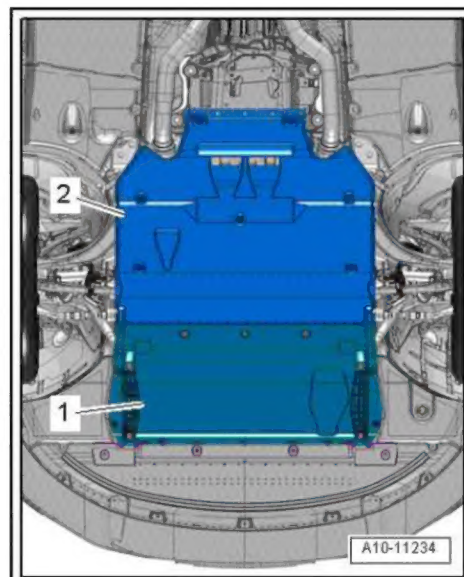
- Renew O-ring and lubricate with clean engine oil.
- Carefully press in Hall sender by hand.
- Secure Hall sender and plug back connector.
- The remaining installation steps are carried out in the reverse sequence.
- Tightening torques
➔ [„2.2 Ignition system - exploded view“, page 55](#)



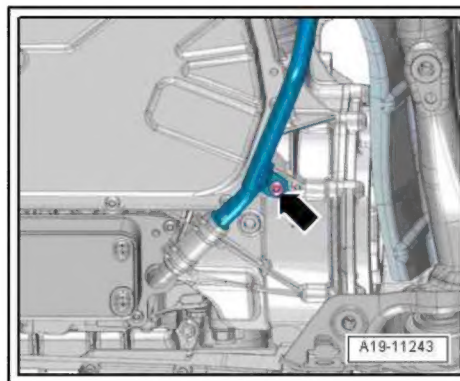
2.6 Removing and installing engine speed sender -G28-

Removing

- Remove rear noise insulation panel -2- ➔ Rep. gr. 66 .



- Remove bolt -arrow- for coolant pipe on gearbox (right-side).

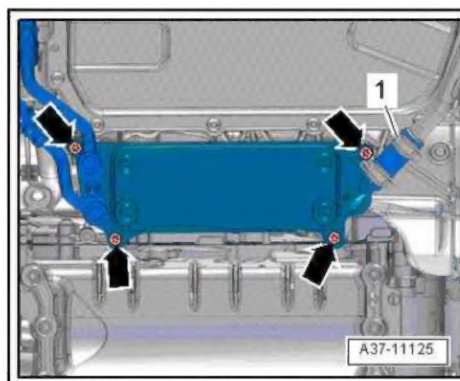


- Remove bolts -arrows- and push ATF cooler slightly to one side.



Note

Disregard -item 1-.

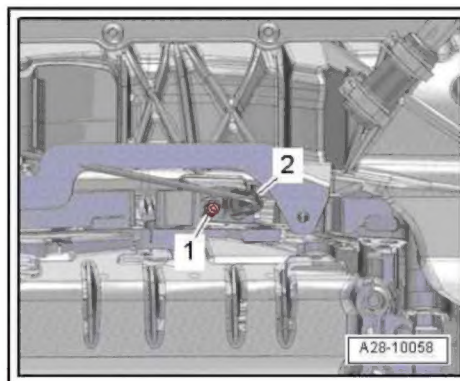


- Unplug electrical connector -2-.
- Unscrew bolt -1- and pull out engine speed sender -G28- .

Installing

Installation is carried out in the reverse order; note the following:

- Tightening torque
⇒ [„2.2 Ignition system - exploded view“, page 55](#)
- Install ATF cooler ⇒ Rep. gr. 34 .
- Install coolant pipe (right-side) on gearbox ⇒ Rep. gr. 19 .
- Install noise insulation ⇒ Rep. gr. 66 .



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